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RIFLES AND SHOTGUNS

WARREN H. MILLER





WARREN H. MILLER
Editor *Field and Stream*.

RIFLES AND SHOTGUNS

*The Art of Rifle and Shotgun Shooting
for Big Game and Feathered Game
with Special Chapters on Military Rifle
Shooting*

BY

WARREN H. MILLER

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AUTHOR OF "THE BOYS' BOOK OF CANOEING AND SAILING,"

"THE BOYS' BOOK OF HUNTING AND FISHING,"

"CAMP CRAFT," ETC.

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no. 1.

PREFACE

Every American citizen should be a good shot, as our forefathers were before us. That ability has been our strength during the short life of the Republic, and the reputation of being a nation of riflemen will continue to be our surest guarantee against foreign invasion, so long as each generation lives up to its duty.

In this era of preparedness, I have not failed to put in a complete treatment of the military rifle, military shooting positions, and the curriculum of the National Rifle Association, the more needful since this information is not accessible to the general public, being for the most part contained in the Small Arms Manual, issued only to the Army and National Guard and not on general sale.

“Rifles and Shotguns” is the gist of the author’s own experience during many years of big game and feathered game shooting. Setting all theories and general average methods aside, what the sportsman needs is a system of rifle and shotgun shooting that will bring home the meat, and that will not crumple and fail in the tense excitement of the supreme moment, that fleeting instant when your gunsights are trained on wild beast or bird making good his escape with every power at his command—and success or chagrin will depend upon the trueness with which the bullet is sped or the charge of shot placed.

And for the hunter it must be realized that military systems, designed to make target scorers out of the general average of humanity, will not fit one for the crucial moment of big game shooting, nor will trap-shooting ever make a wingshot who can knock down his bird with a swift snap in the thick brush. Long experience, of the kind that must not fail to get the meat or else go hungry, as an alternative, has taught me what to discard and what to concentrate on in making of one's self a successful big game or feathered game shot. The sights that will not fail you in the dense timber; the method of gun pointing that loses no instant before connecting shot charge and flying bird; details of gun fitting that count for accuracy; training that will prepare the novice so that he will not have to begin all over again when his proficiency is actually tested out on game; these are set forth in this work so that the beginner can assimilate them.

WARREN H. MILLER.

Interlaken, N. J., 1917.

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RIFLES AND SHOTGUNS

RIFLES AND SHOTGUNS

CHAPTER I

FOUR CENTURIES OF FIREARMS

IN 1907 it was my good fortune to be residing in France, and furthermore to be in close touch with the Musée d'Artillerie in the Hôtel des Invalides in Paris. My good friend M. le Commandant, L. Hardie, then curator of the museum, gave me permission, as an American author and sportsman, to photograph and handle the firearms in that vast collection to my heart's content, and I was not slow to take advantage of the opportunity. Perhaps the most complete bridge in the gap between the antique bombard and the modern automatic high-velocity rifle of to-day is that collection of firearms in the Invalides—2,500 different pieces, arranged in five great halls. I have seen the collections at Dresden and Berlin, the Tower of London collection, and our own magnificent exhibit in the Metropolitan Museum of Art, but it is safe to say that none of them approaches in completeness and extent the great collection in the Paris Musée d'Artillerie. The photographs herewith of the more interesting groups of hand firearms were taken by the author, leaving out the artillery section of the collection as

beyond the limits of this discussion. With the artillery may be classed the history of gunpowder, for for a hundred years the cannon or bombard was the medium through which gunpowder was slowly developed to an excellence where it could yield a velocity suitable for hand firearms using comparatively small missiles fired against armour plate. The arbalest and the long bow still held sway in the XIVth Century as hand shooting arms, the bow, three inches wide by one and one-half inches thick at the centre, and seven feet long, being capable of penetrating all smaller pieces of armour plate, and the arbalest, with its great, steel waggon springs and geared winch to wind it up, driving a steel bolt right through the strongest part of any armour, provided it hit square on, at close range. But gunpowder could give no such force or penetration, for, until you pass a certain velocity, it is impossible to penetrate steel plate, no matter what the size of the ball.

For a century after the first use of cannon, the powder was still so poor as to be useless in anything like hand firearms, but by the year 1430, shortly after Agincourt, the battlefields of Europe began to know here and there the early escopettes and petronels. There are very few of the former still extant. Forged in soft iron, most of them perished on the field of battle or were forged over as old scrap iron. They fired but a very feeble shot, and were usually carried by mounted men-at-arms and fired by holding the iron tail against the armour under the left arm and touching off with a fuse held in the right hand. Out of the vast collection of the Musée d'Artillerie, there are

only five escopettes, dating around 1420, some of which are shown in Fig. 1. Note that the shank was forged in one piece with the tube, and the touchhole was on top, the side touch hole with priming pan not having been thought of until the second half of the XVth Century. The petronels, shown alongside the escopettes, are of the early years of the XVIth Century, when ancient tapestries of battles of the period show us whole platoons of foot soldiers firing petronels, a second man going in front of the musketeer, who laid his heavy piece on the varlet's shoulder. A cover for the priming pan was invented, and the bore of the piece enlarged until it could fire a missile that would knock a knight out of his saddle, even if it didn't penetrate his cuirasse. Frightful bulges these missiles made, as specimen armour shows, enough to kill the man inside from the shock alone. The petronel men thus opened the eyes of field commanders to the possibilities of musket fire, and supplied the incentive to work out a match mechanism to set off the priming.

With the beginning of the XVIth Century the development of firearms began to move fast all over Europe. Charles V of Spain became Emperor of Germany and therefore of the Holy Roman Empire, so that nearly all civilisation was under one prince, and in Spain was invented the first *matchlock*. Just a serpent's head holding the end of a rope or fuse which snapped down into the priming when the trigger was pulled, but it made a really formidable weapon of the petronel, because it could be fired instantaneously. Besides which, the obvious scheme of

putting a movable cover on the priming pan was thought out in all its details, and all the vast armies of Spain and France began to arm their foot-soldiers with this new weapon, called the musquetoon or arquebus, depending on the calibre. Almost simultaneously, in 1515, the wheel-lock was invented in Nuremberg and the wheel-lock arquebus spread throughout Germany and the Empire. If you take a stone of yellow pyrites and rub it violently across a file a shower of sparks will be raised. As this Nuremberg genius couldn't rub with the pyrites-stone in any known form of hammer, he made the file part in the shape of a *wheel*, which spun around under the pyrites when the hammer came down. The wheel has a chain and spring acting on its post and is wound up with a crank, carried along with the weapon as in arbalest days, and is locked by the trigger. The hammer also has a strong spring and the trigger releases both wheel and hammer. The priming powder lies in a pan whose bottom is the serrated rim of the wheel and the sparks ignite it.

This wheel-lock made a very complete mechanical fire-arm of the arquebus, and it soon became popular all over Europe. The armourers and locksmiths of that day were used to fine work and turned out exceedingly craftmanlike, handsome guns, light, and easy to aim and fire. They were used for both hunting and in warfare, and such guns as the arquebusses of Louis XIII and Cardinal Richelieu are examples of the combined jeweller's art and gunsmith's craft seldom equalled in our day.

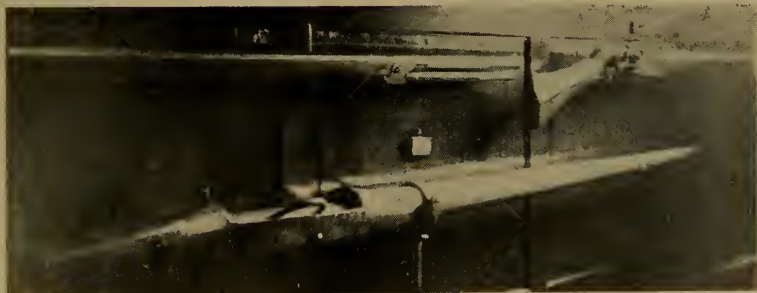
The name arquebus comes from the German



FIG. 1. EARLY ESCOPETTES AND
PETRONELS



TYPES OF PERCUSSION-CAP
REPEATERS



THE EARLIEST BREECH-LOADING MUSQUETOON

hacken-buchse or "crackling-tube." This gun had two serious drawbacks for use in war, though well adapted for the chase. In the first place it was of rather small bore, firing a ball weighing only one-third ounce or forty-eight to the pound, and so had very little penetrative force, owing to the poor quality of the powder. The arbalest, with its steel waggon-springs and heavy steel bolt, could shoot right through a coat of plate at short range while the arquebus ball simply caromed off and hit some one else. The second drawback was that pyrites is prone to misfire and give no sparks at all, particularly when some tall antagonist is about to spit you with his partisan. To avoid this unfortunate eventuality they often supplied the arquebus with *two* hammers, sometimes both of pyrites, often with one match and one wheel-lock. In spite of these difficulties the arquebus was very extensively used. Large divisions of the Spanish armies consisted entirely of arquebussiers and they also played a very prominent part in Germany in the Thirty Years' War.

But in France the wheel-lock never came into any great favour. The matchlock was surer to go off and easier to manufacture. Besides which the French were determined to fire something at a knight in armour which would at least attract his attention—which the arquebus certainly did not—so the musketoon gradually became the standard weapon of the French armies, and the musketeers of the type of D'Artagnan formed the back-bone of the armies of Condé, Turenne and Prince Eugene of Savoy. This gun was of an inch bore and larger, firing a ball

weighing an ounce and a quarter—which pellet, even with the villainous powder of the times, would crash through any cuirasse ever built. The gun itself weighed twenty or thirty pounds, had trunnions for its fork-rest, and was fired by a matchlock. A varlet was needed to help carry it about, just as with the petronel, whence the need for a groom, such as D'Artagnan's Planchet or Athos' Grimaud, often very much attached to the musketeer he served. Of course the matchlock was quite often used on the arquebus and the wheel-lock on the musquetoons. The real distinction lies in the weight and calibre of the weapon.

The warfare of the time of Louis XIV was chiefly noted for the siege character of the operations. Marlborough and his victories of Oudenarde, Malplaquet, etc., were but the results of prolonged siege and fort warfare, which had its due influence on firearms in the shape of long-range, accurate rampart weapons which could pick out a horseman or a knot of generals and do damage among them even at a very considerable range. To get this range and accuracy with the powder still in a quite primitive condition, you had but one recourse, lengthen the tube of the barrel. Some of these extraordinary siege weapons were fourteen feet long and over. The photograph, showing a very complete set of examples of long-range siege guns, will give you some idea of how they looked. Those shown with shoes on were for the obvious purpose of resting the fore end on the ramparts instead of on some husky villain's back.

Of these siege guns the first in importance were

the long rampart guns, with swivel shoes on, and of extraordinary lengths, with nine to fourteen feet of barrel. This barrel was not only to shoot long distances with the heavy ball and slow-burning powder, but also to be able to hit something by reason of the better accuracy it gave. The other requirement of siege operations was to be able to fire fast and furious when storming parties scaled the ramparts. The devices thought out for rapid fire by the ancient gun-cranks have been endless, and of an ingenuity worthy of a Connecticut Yankee. Fig. 2 shows, besides some shoed rampart guns, a number of curiosities for quick firing, such as the German gun with three barrels on one stock; the organ-pipe gun, with six barrels touched off in turn with a punk; and the two guns with eight and ten barrels respectively, set off by a single hammer on each side in sets of four or five. They also had revolving *matchlock* guns in great profusion, both with the chambers revolving and with sets of barrels turning about a central pivot. There is also a gun with chambers in a traversing breech-block, which is the Mediæval prototype of our most modern cartridge-clip.

Undoubtedly the first repeating arquebus was invented by reason of the classic mistake of getting two loads in the same barrel, one on top of the other. This did not worry our forefathers any. They just took the offending arquebus to the gunsmith who "fixed" it by simply boring another touch-hole and adding a second wheel-lock. The gun now became a repeater, since you fired off charge No. 2 with one hammer and charge No. 1 with the other. The king

arquebus of all the resulting tribe is a matchlock with *eight* touch-holes along the same barrel. You rammed down the eight charges one on top of the other, with nicks on the ramrod to see that they were spaced right, and an ingenious track action brought down the match serpent into each touchpan in turn, every time you pulled the trigger. The writer has handled and aimed this invention, and can vouch for the perpetrator having been a large, powerful man, for the arquebus weighs at least twenty-five pounds and takes every ounce of a modern man's strength to even aim it.

The inventor evidently escaped with his life without firing off No. 1 prematurely instead of No. 8, but probably became discouraged on seeing a line of powder spouts out of all his touch-holes when No. 1 finally went off, and the bullet rolled out of the barrel at a greatly reduced velocity.

Almost every scheme of modern times has been tried by these early gunsmiths. The first breech-loader is a musketoon nine feet long, of the latter half of the XVIth Century, weighing nearly sixty pounds. It has the bolt action, which was not then appreciated, nor used extensively until the Prussian needle-gun of nearly three centuries later. Its bolt weighed six pounds, but it locked into the gap of the breech on turning ever on its side just as with modern arms. The charge was touched off with a matchlock.

The introduction of percussion caps about 1815 brought in its train numberless queer inventions, particularly among the investigative Germans. The



LONG BARRELED SIEGE GUNS OF THE 17TH CENTURY

swinging breech-block being already an old story, why not make the gun mechanically self-loading? In the XIXth Century hall are a number of these absurdities, upon which so much machinery is assembled that it is difficult to find the gun. One lever fills the breech with powder from a brass magazine, another puts in the ball and squeezes it home, another puts on a percussion cap and cocks the piece. All the shooter has to do is to go and get some one else to fire it for him, and then collect the pieces of his friend for the funeral!

Another invention, since duplicated in our day, is a primitive "silencer." An arquebus of the date of 1615 has labyrinthine vents cut all over the barrel for a foot back from the muzzle.

The stocks of all the early arquebusses are extremely short, square and clumsy, so that to aim one nowadays you have to hold the flash-pan unpleasantly near your eyes. The reason for this was that all the foot-soldiers of those times wore a steel cuirass and steel sleeves on the arms, and the stock was cut to rest nicely against the breastplate or projection from the sleeve, which was several inches from the man's real body.

But we are getting ahead of our logical *chronique*. By far the greatest invention in firearms was the product of a famous hotbed of armourers and gunsmiths that centred in and about Madrid, Spain. This was the flint lock, called originally the Miquelet lock, after its inventor.

Consider what he had to do to make a step forward from the serpentine and the wheel lock. He

had to somehow arrange to strike a flint against a steel so as to direct the resulting spark into a pan of priming powder, and yet keep said pan closed and dry against the elements up to the instant of firing. As the wheel lock already had its components assembled outside the lock plate, he followed suit, put a flint in the mouth of the hammer instead of a match or bit of pyrites, arranged his main spring as in the earlier wheel locks outside on the lock plate, and then he made a steel cover for his priming pan which would be struck by the hammer and opened at the same time the flint scraped past the edge of the steel. This involved a right-angle cover, with a big ear sticking up, which is the first thing the hammer strikes. The force of it throws open the pan and the flint scrapes the sharp edge of the cover, thus showering sparks into the pan. This discovery dates about 1630, and it at once paved the way for standardisation of arms, and made possible regular bodies of infantry all armed alike and firing at command in platoons. In Spain the Miquelet lock kept its original form for many years, and in the Barbary States the Arabs still use it to this day, but the French turned the lock around so as to sink the spring and trigger mechanism into the wood of the stock, which is the form it has remained even to this day in all civilised countries. Practically the only change in the lock, outside of the percussion end of it, has been in the modern Anson and Deely lock, located in slots under the barrel, as described in our chapter on Shotgun Mechanics.

We have, then, roughly, a hundred years for the

period of glory of the matchlock and wheel lock, terminating early in the XVIIth Century, when the flint lock came to stay. It misfired a great deal at first, and Vauban, the great French military authority, armed the infantry of France for some time with two-hammer locks, such as are shown in our illustrations, in which a serpentine (or sometimes a wheel-lock) and a flint lock both touched off the powder, and if the first misfired you had merely to touch the second trigger. How this idea ever got by the logical-minded French is beyond me. Since the serpentine was sure to go off, why bother with the flint lock at all? And the answer is probably—rain. *La pluie* is always to be reckoned with in France, putting the serpentine out of the running entirely, and if the enemy was disposed to fight in the rain there would be nothing to do but give him your best with an additional flintlock. Eventually, the flintlock was perfected by testing flints and tempering the steel, so that it seldom misfired, and it reigned supreme and fought all Europe's wars for two centuries; saw the rise and decline of Louis XIV.; the decline of Holland; the rise of England as a colonial empire builder; the rise and fall of Napoleon; and the birth of liberty in the United States of America. Then, about 1815, the first glimmerings of a fulminate of mercury cap, that would explode with the blow of a hammer, began to shine forth in crude inventions of the percussion cap, which finally reached its zenith about 1840 with the well-known (and well-belaboured) G. D. caps of our grandfathers.

The percussion cap had a short life, not over

thirty years, before it was put into the cartridge and the reign of the breech loader began, in which the hammer either came down direct on the head of the primer or else struck a firing pin which dented the primer and set off the little particle of fulminate of mercury between the primer head and the primer anvil.

Another important invention in firearms, rifling the bore, we have had with us since the last half of the XVIth Century—1585 being the earliest date on a rifled arquebus that I can find. The original idea of the rifle grooves was simply to provide a way to blow out the crude products of combustion of the powder, thus making the gun self-cleaning. For a hundred years before 1585 the armourers of Nuremberg had tested out and appreciated the effects of spinning an arbalest dart about its axis by means of helical vanes. The museums of the world are full of such bolts, fitted with curved copper, wood and feather vanes. Any object to which a rotary motion has been imparted sufficient to set up gyratory action is very difficult to deflect from its position. It will not keyhole, nor dum dum, nor, if it strikes a minor obstruction, will it be set wildly off its course and go all to pieces, but it will rather pursue the even tenor of its way, piercing the obstruction if it has force enough and continuing on undeflected. All of this had been well established by tests in Nuremberg with arbalest bolts, so it was but a step to utilise the cleaning out grooves to twist the bullet by cutting them with a rotary motion to the cutting tool as it was drawn through the barrel. Once a nice twist was

established, the cutter would make this deeper and deeper, each time drawn through the barrel, and so we find many of these earlier riflings *à tournelles*, that is, with little circular grooves cut in the points of each rifle groove so that the powder residue could be blown out of these channels while the bullet was being rifled at the same time. Needless to say, with higher gas-making capacity in the powder charge, these *tournelles* were dispensed with as wasting too much gas pressure.

Of course, simultaneously with rifling, came the elongated bullet, with cone head or even with the parabolic head and fine entrance of modern bullets. In fact, as gunsmiths, there was little that we can do to-day that those early armourers could not duplicate. Rifled muskets, or *carabines* as they were universally named, were used as military arms almost simultaneously with the discovery of rifling, the earliest regiments being those of Wilhelm, Landgrave of Hesse, in 1631, and of Elector Maximilian of Bavaria in 1641; while Louis XIV had a corps of riflemen as his personal bodyguard. In 1679 he decreed that in each company of light cavalymen there should be two riflemen, and later united all these into a separate regiment of *carabiniers*. During the Seven Years' War, Frederick the Great had a battalion of hunters armed with rifles, and in Sweden the sub-lieutenants of dragoons carried the same weapon. In France the first regulation rifle was adopted in 1793, period of the Directory, and was hence called the *Carabine de Versailles*.

Cartridges first came into use about the time of

Louis XIII, with the Musketeers, and were at first carried in a bandolier, later in a protected cartridge box; they all took the form of a paper roll, bit off with the teeth at the powder end.

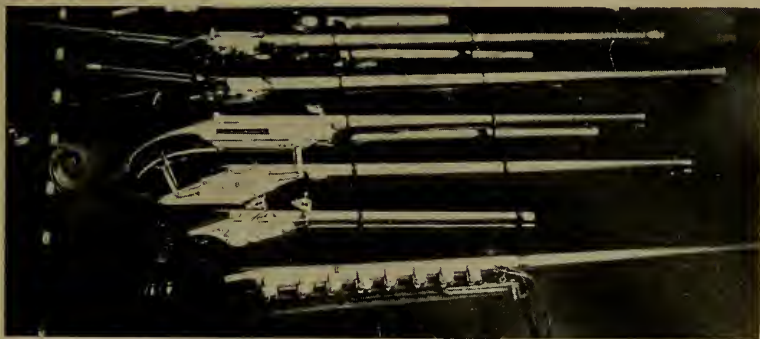
It is a fascinating study to browse among the early firearms of the Musée d'Artillerie and piece out by their markings and decorations the military history of Europe. Here, for example, is a short Italian musketoon, with its wheel lock, bearing the inscription, *Viva chi difende di casa Farnesa. Mafeo Badile fecit*. Now we learn that Mafeo Badile was a celebrated armourer who flourished about 1650 when the feuds between the Farnese, the Medici, the Barberini and the Borgia rent Italy, and so this gun doubtless served the Farnese clan in the Papal wars of that period. Here is a French wheel-lock arquebus, richly decorated with engraving and sculptured ivory. A picture engraved on it presents a costume of the time of Henry IV of France. This dates it about 1590 and suggests the battles of Arques and Ivry against the Catholic League, in which this weapon probably took part. Also recalls Sully and the Edict of Nantes. The musketoon next to it actually belonged to Henry IV, and has his portrait in bas-relief in ivory on the mahogany stock. It is exceeding richly inlaid with gold and silver and is rifled with four grooves, thus being also one of the earliest known rifles. The horn of the stock terminates in a finely carved demi-globe of the world, with a map carved on it of all that was known of the world at that time.

Another interesting weapon is a German arquebus



FIG. 2. RAMPART SIEGE GUNS, GRENADE GUNS AND MULTIFIRE WEAPONS

Note on left guns with 8 and 6 barrels, in center 6-barrel gun and on right 3-barrel gun. Grenade guns have long curved stocks.



DOUBLE-FIRE GUNS

Owing to the uncertainty of the pyrites stone of the wheel lock, two locks were often provided. Note 8-touchhole matchlock repeater at bottom of picture.

of about 1660, rifled in pentagon *à tournelles*. It is a wheel lock with the hammer burying the pyrites completely in the pan and provided with a little chimney four inches long to carry off the smoke of the priming and direct it away from the shooter's eyes. The inscription *Joann Mendelos in Oprago* shows the maker to have been a Spaniard in Prague, but the escutcheon of Hans Christoph and the inscription *Stifter Hans Christoph de Prague* shows it to have been the property of that famous cannonier, and therefore to have taken part in the siege of Prague by the collected might of Sweden, which closed the 'Thirty Years' War. A little farther on in the collection one stumbles upon another early rifle, of the date of 1585, a German wheel-lock arquebus. It bears upon the long trigger-guard an engraved figure of a warrior carrying a shield with the arms of the Empire on the right and the fleur-de-lis of France on the left. What alliance between Germany and France of the date of Henry IV does this suggest? 1585 suggests Catherine de Medici and her three weak sons who held the throne of France under her direction. As Henry IV was the first of the House of Bourbon and did not come to the throne until 1589, when he was then an ardent Protestant, detesting the religious convulsions brought on by the regency of Catherine, this rifle must have been borne by a soldier under Guise who commanded the Catholic armies. As France was very restive under the continued fire and slaughter of the religious wars and broke into open rebellion, driving Henry III from Paris about 1585, this weapon was evidently carried by one of the armed mercena-

ries of Rudolph II, who succeeded Charles V as Emperor of the Holy Roman Empire and was an ally of Catherine in all her wars and intrigues up to her most fortunate death in 1588.

Among the musquetoons there is a matchlock, of the end of the XVIth Century, bearing the inscription *Pour la Ville de Paris. Nicolas Colas*. He belonged to the Guards of the City of Paris, organised at the same time as the events of the arquebus just described, and this very musket took part in the rebellion of Paris which drove out Henry III, ended the reign of the House of Valois—and may have been fired at that mercenary who bore the Franco-German arquebus, for all that we know!

Another, belonging to the same page of history, is a beautiful matchlock musquatoon, heavily engraved with inlaid filigree work in copper, and incrustations of pearls and mother-of-pearl. It carries on the muzzle an engraved head of a Turk, with a bell-mouth muzzle and a groove for the sight. It bears the inscription, *Pour maintenir la foi, suis belle et fidelle, et aux ennemis du rois, suis rebelle et cruelle*. (For maintaining The Faith I am faithful and serviceable; against the enemies of the king I am harsh and cruel.) Needless to say on which side this gun fought!

One can spend weeks in going over the workmanship and inscriptions of these weapons of all centuries, each so distinctive of its time and maker; and when all is done the whole scene of the politics and nation-building of the countries of Europe stands out like a vast picture painted in indelible records left by

the very armourers, gunsmiths and soldiers who made the history, fought out their religious convictions and political ideals, and left the Continent a family of nations each as distinct types of the human ideal as diversity of thought and life could make them.

CHAPTER II

RIFLE MECHANICS

THAT wonderful mechanism, the modern big-game rifle, is such a triumph of the gunmaker's art and the woodsman's experience that we, who use them thoughtlessly, would do well to contemplate, just for once, all the labour, brains and experience that go into the makeup of such a first-class weapon. The ideal must meet the following requirements: It must be true to itself and of good steel, so that its bullet will always do the same flight in the same way, and this regardless of a reasonable amount of negligence in cleaning; it must be safe and fool-proofedly so, so that the enormous recoil of the high-power cartridge will be blocked at the breech by solid metal, bearing against the solid frame of the weapon, and this blocking must take place before it is possible to fire the rifle, so that no prematures can occur in moments of intense excitement. The ideal rifle must handle cartridge after cartridge, feeding them into the chamber and discarding the empty shell without possibility of jamming in the excitement of the chase, smoothly and without too much effort on the shooter's part; its sights must be optically adapted to pick up faint and indistinct marks and define them clearly in all kinds of lights; the hang of the weapon for quick sighting

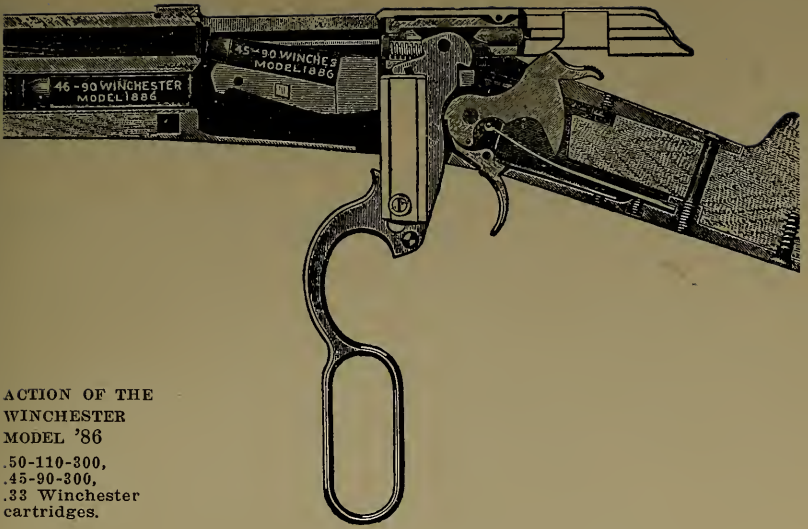
must be right and not change materially on emptying the magazine; the contour of it must be graceful and handsome, totally enclosed by the action, with no awkward recesses to catch and hold dirt and sand; no small and intricate sighting mechanisms or other easily broken parts must be exposed to the vicissitudes of mountain and trail work; the rifle must be easily cleaned and dismounted, and, finally, more than one strength of cartridge in the same weapon is exceedingly desirable.

Quite a formidable list of requirements; but note how well they all are met by American rifle-makers in half a dozen true and tried models that are in daily use by millions of American riflemen! Of course, the scope of this chapter is too limited to describe the many forms of rifles that have found favour with the American public, but a dissection of how the ideal has been met by several well-known types is well within our space. We have room for a look at two of the best single-shots, four justly popular lever-action repeater models, one good automatic and the best of our American bolt-action sporters. And, as every sportsman should know something of what goes on inside the receiver frame of his rifle when he operates its reloading mechanism, we shall confine ourselves more especially to the mechanics of the weapon, the "action," so-called, of the rifle.

With the single-shot rifles the gunmaker's problem has been comparatively easy, and the embodiment of the best practice may be found in the popular Stevens and Winchester single shots, in which the breech block slides up and down in grooves cut in the

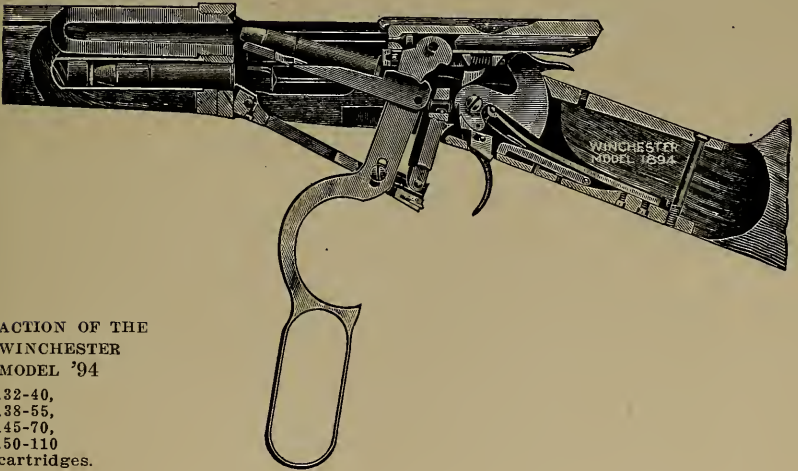
receiver frame, actuated by an under lever, which is also the trigger guard, and, further, operates a simple extractor in a recess in the receiver frame. No possible chance for the cartridge to blow back here, nor can it be fired prematurely, because the firing pin is in the breech block and is not presented to the hammer until the block is securely centred behind the cartridge. The barrel is secured solidly in the frame, thus insuring trueness to itself of the bullet's flight in respect to the sights no matter where mounted, which cannot be had where the barrel moves on a hinge in opening the gun, as in shotguns. The extractor merely starts the cartridge out of the chamber some one-eighth inch, after which the fingers can grip the shell, and with factory-made ammunition this is no great hardship, though hand-loaded work may sometimes be swelled so that the shell sticks in the barrel. In both of these rifles the breech parts are made big enough to fill up the general contour of the weapon, leaving a smooth exterior, with no holes or pockets to catch grit and dirt; the hammer is the only projecting object, and safety is assured by making this of the rebounding-lock type, with the trigger sear in the notch at all times, so that a blow from behind the hammer cannot force it on the pin and accidentally discharge it. Both rifles are "old reliables," beloved of all the riflemen of America, and few sportsmen's households are without at least one specimen of them, usually the .22, though they are made for nearly all the large calibres.

When we come to the repeating arms the gun-maker's problems are much multiplied. Not only



ACTION OF THE
WINCHESTER
MODEL '86

.50-110-300,
.45-90-300,
.33 Winchester
cartridges.



ACTION OF THE
WINCHESTER
MODEL '94

.32-40,
.38-55,
.45-70,
.50-110
cartridges.

must you have a safe breech, but you must provide a mechanism that will pick a cartridge out of a magazine, insert it in the rifle barrel chamber, cock the hammer, throw out the empty cartridge and put in a new one, all in one motion of bolt or lever. And those last three words bring us to the most joyous part of the wordy controversy that has raged for years in the sporting press; *i. e.*, the great bolt vs. lever contention. They are really *all* bolt-action rifles, every one of them, only in some you operate the bolt by hand, grabbing a knob for the purpose, and in others a trigger guard lever operates the bolt for you!

Let us, then, look over the mechanics of a few of the old reliables so that we shall have more than a bowing acquaintance with the outside of the gun. Beginning with the popular Winchester Model '86, never more in general use than right now, when its .33 moose cartridge and the dependable .45-90 keep it still a big-game hunter's favourite, we have here a representative tubular magazine rifle; in fact, the best development of the tubular type, for with larger and longer cartridges there is not length enough for enough of them and we are forced to go to the box-magazine type.

The action of such a rifle is simplicity itself. You have really four main parts: the main bolt, finger lever, cartridge carrier and locking bolts. Throwing down the finger lever slides back the main bolt, which pulls the empty shell along with it, and, riding down the hammer, cocks the rifle. At the same time the spring in the tubular magazine has shot a cartridge into the carrier and the latter lifts it, with the last of

the downward motion of the lever, up in front of the bolt and in position to slide into the chamber. Right here is a practical point where many riflemen fall down in the woods; they get excited and fail to drive home that last downward motion of the lever, starting to reclose it too quick in their hurry, with the result that, as the cartridge has not been lifted up enough, it cannot get into the chamber and a temporary jam results. Besides practising to shoot your rifle accurately, you ought to give a good deal of time to running magazines full of cartridges through the action at full speed. Also put in lots of time firing full speed at a target, feeding through the action as with actual big game. I know that it doesn't make as nice scores as you really *can* make, firing the weapon single-shot, but are fine scores really what we are after? Continuing the action of the Model '86 lever; as the hand brings it up again, the bolt forces the new shell home and the lever raises the locking bolts into position. These are those small, bright-looking metal squares that you see coming up from below when the action closes, and they are the one thing needed to bring the contour all flush, with no holes or dents and hardly a crack for snow, twigs, needles and sand to get in by. Your rifle is now cocked and ready to shoot, and the whole action of reloading was done with the quickness of a hand-flash. You may want to plant that shot right off, or you may have a considerable stalk to make, in which the care of your rifle will be subordinated to the all-important practical consideration of keeping flat to the ground and making no noise; in any event, there is little about the rifle

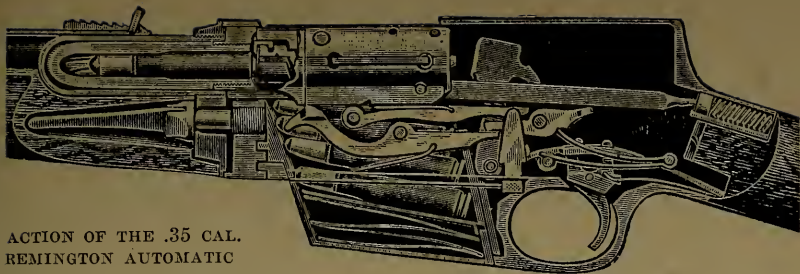
that will catch and hold twigs and briars, and nowhere that dirt and pebbles can get in and clog.

This model will take high-power cartridges with the utmost safety, as the locking scheme—two bolts sliding in grooves, half recessed in the frame and half in the bolt—is about the last thing that can fail in the action. The Model '92 is almost a duplicate of it; being designed for short, stubby cartridges, its carrier swings on a pivot operated by the toe of the lever instead of being translated straight up and down, as with the larger cartridges of the '86. In both rifles the way to start taking down to give them an annual cleaning is by taking off the butt. Important pins cannot be got at to drive out unless you do this, for other parts must first come out to let you get at them. One hesitates to unscrew the mainspring and take out the hammer in order to get at the rest of the mechanism, but it must be done about once a year, as all the small parts on a long hunting trip get coated with rust and grease and ought to be taken out, soaked in kerosene, cleaned and replaced. I have done it in camp with no other tools than my hunting-knife, axe blade and a small wire nail. The camp axe, if of good steel, makes a good screwdriver, using the turn of the upper corner of the poll. With the rifle stock off, all the rest of the dissection is plain sailing.

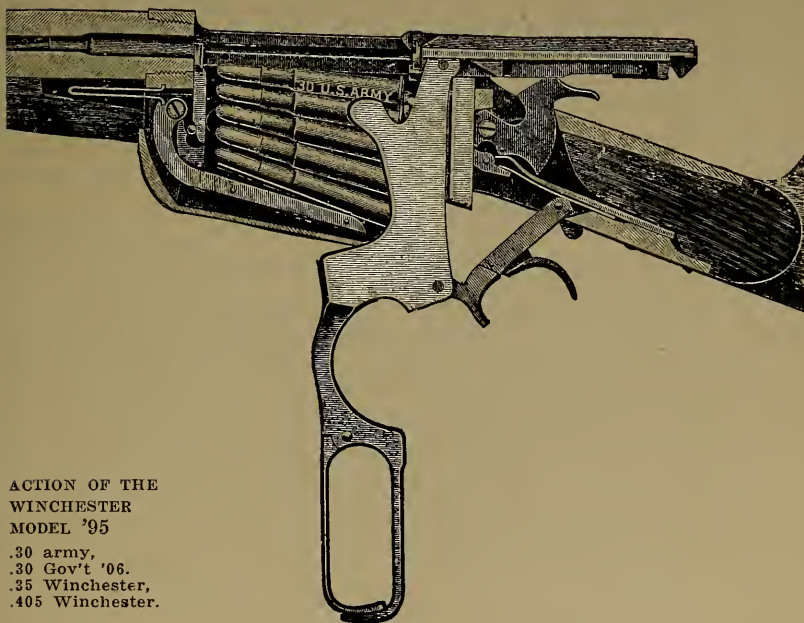
The necessity to handle long cartridges in the tubular magazine led the Winchesters to develop the Model '94, and, in box-magazine type, the later Model '95, one of the most popular of big-game rifles. The need was for a longer swing to the lever, and this could not be had without dropping the centre to some

point below the frame to swing on. More room was wanted, also, in Model '94 frame to handle those long shells (the .32 Special, .38-55, .30-30 and .32-40), so the locking bolt was moved back behind the bolt, where it could be poked up from below, between the end of the bolt and the solid back wall of the receiver frame. Mechanically, this type of backstop and the one in grooves is stronger and safer than some forms of side lugs such as are found on military rifles, for the latter must be forged to shape, introducing hidden weaknesses, and are subject to crystallisation from the pounding of the recoil, as are all outstanding bits of metal on all machinery. But a plain bit of mild steel, like these Winchester locking bolts or the Savage main bolt, backed by the receiver frame, while they may be squashed like cheese with excessive pounding, will never become brittle or crystallise and snap off.

The Model '94 action is a delight to the mechanical engineer for its simplicity. Throwing down the lever at the same time drops down a piece of the bottom of the receiver frame, thus lowering the central pivot, so that you get a long swing to the lever head, which slides back the bolt. This bottom piece also carries down with it the locking bolt, which, by the way, will be the last thing to come back—just when it is wanted to close and make safe the action. Further up on the lever is pivoted the long carrier onto which each cartridge is shot from the magazine by the tubular spring. As this carrier does not need to come into play until the lever head is well through its work of sliding back the bolt, its position far up on the lever insures this—



ACTION OF THE STEVENS SINGLE SHOT FAVORITE



ACTION OF THE
WINCHESTER
MODEL '95

.30 army,
.30 Gov't '06.
.35 Winchester,
.405 Winchester.

altogether the Model '94 action is quite a triumph in instantaneous centrics.

But still larger and heavier cartridges, not only too long end to end to go well in a tubular magazine, but so heavy as to seriously affect the balance of the rifle, led to the adoption of the box magazine for the lever gun in the Model '95. Now you will have a few more problems to contend with: The box magazine prevents you dropping down a piece out of the frame to get a low pivot for a long lever motion—all right—we drop a piece out of the *trigger* part of the frame, taking the trigger with it, and all is well, for we have now a long lever finger, with a shifting centre, so that, as the bolt slides back the centre below almost parallels it, making a very smooth action, needful, indeed, with such big cartridges! The box magazine introduces a separate problem of its own, for the lever head must straddle it, and so we find the lever in two broad, flat strips of steel sliding over the box, a part that must be kept oiled, and from which water must be kept away in cold weather or it will freeze fast and all your strength cannot move it. The Winchester people have provided against this, however, in their usual tight, smooth closing of the whole action, and, as a film of oil on the lever plates will last for a long time without renewing and of itself keeps out water, I have had few complaints to register from freeze-ups, especially as we clean snow water out of our rifles every night in camp on the hunting trips.

The box magazine did away with the carrier; all that is needed with it is a spring or spring-operated pusher to raise the cartridges up into place. The ex-

tractor tosses the empty shell out of the action as soon as the lower part of the head strikes the trip plate on the carrier. A jam here is only possible through not throwing the lever down far enough to trip the cartridge—easily rectified, even in a swearing hurry, by simply completing the motion, when the cartridge is released and a new one shot up under the extractor circle. To dismount you begin at the magazine, instead of the butt, as in the other models. Taking off the fore end exposes the screw and spring controlling the magazine pusher. Two more screws release the magazine box. Turning out the mainspring screw releases the hammer, and its removal permits getting at the lever pins, which can be driven out with a wire nail.

The safety locking device on this model deserved especial consideration, owing to the powerful cartridges handled. Following the lead of the Model '94, and for much the same reasons, the safety is a bolt pushed up from below, in between the rear end of the bolt and the rear wall of the frame. If you will look at the rear end of your '95 you will note it dropping down immediately you start the lever, and will see how much of a wall of solid steel (more than equal twice the cartridge base) it interposes between the bolt and the frame. In order to let the hammer get at the firing pin a notch is cut in the centre of the locking bolt, which takes the lower half of the pin, the upper half being its projection from out the main bolt. A great old rifle is the '95; in its three powerful cartridges, the .405, .35 and .30 Government '06, it is a great favourite for big game, a nicely balanced weapon

that stays so, clean and smooth outside, easy to handle and climb with, quick to fire, and, with a tang peep, a folding leaf with white diamond in middle slot and a plain knife front sight with 45-degree flat filed on it, it makes a nice hunter's weapon. For auxiliaries you have .41 Colt, the .380 Colt in steel Marble-Brayton cartridge, and the .32 S. & W., for the three main calibres of .405, .35 and .30 Government '06.

Closely allied to the above actions are the Marlins, the principal difference being that the top of the receiver is closed in, the rifle throwing its shell out the side; the lever is pivoted from a lug below the frame to give a longer slide to the bolt than with pivoting through the frame; and the lacking lug is pushed up from below inside the action, taking its bearings on grooves cut in the frame. The action is simple and of a few strong parts. It is somewhat hard to get at the cartridges from outside the frame in case of a jam, but compensations are found in the complete protection to the interior parts by the solid receiver top. These rifles are adapted to such cartridges as the .32-40, .38-55, .30-30 and .32 Special, besides the smaller and stubbier designs.

Differing radically from the above are the repeating actions exemplified by the Savage rifles, whose .303, .22 hp. and .250-3000 cartridges are in such universal popular favour. The scheme of the Savage action is simple and strong. The bolt is a solid block of steel fitting snugly into the opening of the receiver frame. When the lever is operated this bolt entire is pulled first down and then backwards, exposing the box magazine, from which another shell is proffered

as soon as the extractor tosses the empty away. In the closing motion the bolt comes forward, pushing the new cartridge into the chamber before it, and at the end is pushed snugly up into the frame recess so that its front end rests against the cartridge head and the rear end against the solid metal of the frame. The only way this could fail would be by first lowering it in some way, which the recoil cannot do.

This bolt is operated by a long, curved link, forming with the trigger guard and finger lever a U-shaped device pivoted to a lug underneath the frame. As the bolt is as long as the receiver frame and must come back its own length to expose the magazine, it follows that this link mechanism must be placed under the tang instead of under the receiver, as with the Winchester and Marlins. Undoubtedly an element of weakness, due to the hollowing out of the stock wood, but the compensation lies in having the weapon hammerless and giving it a smooth and graceful outline. Once closed there is very little place anywhere on it for rain, snow, grit or twigs to get into the action; a good stalking rifle.

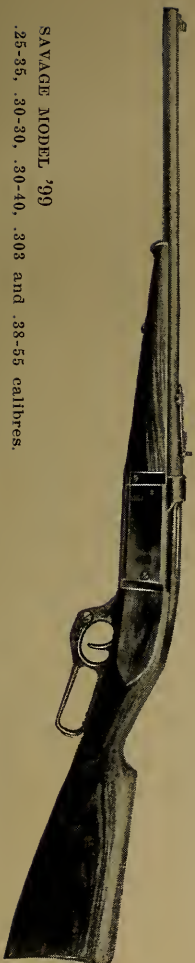
As far as hammer or hammerless goes, that is a matter of individual preference. Whether to monkey with safeties and the sense of touch to tell you whether full cocked or no or whether to rely on a glance of the eye and a hammer always handy to the thumb is for you to decide. I am an old foggy and prefer the hammer that I can see and know just what it is doing and that no safety device can ever put on the fritz. I can endure a hammerless shotgun—that is, *some* hammerless shotguns!—but I am not enough



REMINGTON .35 CALIBRE AUTOLOADING



MARLIN REPEATING RIFLE '92
Made for .22, .25, .30-30, .32-20, .32-40, .33, .38-55, .44-40 and 45-90 calibres.



SAVAGE MODEL '99
.25-35, .30-30, .30-40, .303 and .38-55 calibres.

weaned yet from the Queene Anne musket to adopt a rifle without any visible hammer. What would we old Ku-klux-klaners do without our Ku-Klux!

The magazine of the Savage rifles is of the rotary box type; that is, the shells are held by their rims in a rotating device that presents one at a time before the bolt head. The extraction is sidewise, and, as the shells are held by the rims, they are noiseless, and spitzer-pointed ones cannot be burred by hitting their points against the forward box walls. As might be expected with such an action, it lends itself particularly well to powerful cartridges, as there is no limit to the recoil the bolt can stand and no limit to the length of cartridge, since the bolt can be made as long as needful without introducing carrier or locking bolt problems. For moose and large game the .303 has always been a favourite, also the .30-30 and .38-55 Savage for deer, while the two new products, the .220 and .250 high-power, high-velocity cartridges, after they had gotten over manufacturing troubles with the ammunition, turned out to be very good for all the smaller big game at long ranges where trajectory heights and loss of energy through distance counted.

Among the automatics we have space to examine but one, the justly popular Remington .35, one of the best all-around big-game rifles made. For five shots quick, with plenty of steam behind them, this rifle fills the bill, and all American game, from the huge Alaska brown bears to the giant moose of New Brunswick, have gone down before it. Outside it follows the usual American gunbuilder's practice of nothing on it to catch and hold in the underbrush. The rifle is

clean all over, no hollows or holes, no machine shop full of micrometre sights on its back. Inside, this automatic is simplicity itself. A spring and push-rod in the stock drive the breech bolt with its extractor and firing pin forward against the barrel, with its cartridge in the chamber. This barrel is inside a steel jacket, which is what you see looking like a barrel when you take the rifle in your hands, and it can slide back inside its jacket about three inches. When you fire the rifle the recoil of the cartridge against its bullet drives the whole works, barrel and breech bolt together, back inside the receiver, riding over the hammer on the way back. The breech block is held back for an instant while the barrel starts forward, urged by a spring inside its jacket. In doing so it leaves its cartridge shell behind, under the finger-nail of the extractor, and, as soon as the barrel gets forward enough to clear the empty cartridge, the extractor tosses it out of the action. That gives a chance for the next cartridge to spring up out of the box magazine, tripping a release as it goes, which lets the breech block shoot forward again and the rifle is reloaded. All this takes place so quickly that you cannot see it done. All you see is a flash of brass as the cartridge pops up into the air, and you wonder on which side of your Stetson it is coming down! Pulling the trigger releases the hammer again and the same cycle of operations is gone through. To load her single-shot you have an exterior knob on the breech bolt by which it can be grabbed and pulled back by hand until it catches. The barrel will stay in place, being held forward by its spring. Now put in your single shell (or

load the clip) and press on a release catch outside, when the bolt will fly shut and the rifle is ready for business. A rather clumsy safety consists in a flat lever, built on outside the receiver, which is in the way of the bolt and therefore on "safe" unless pressed down, when it exposes a large crack in the frame, through which all the dust in the world could get during a long stalk. Of course, you do not stalk with the safety off as a rule—but then again you do—sometimes!

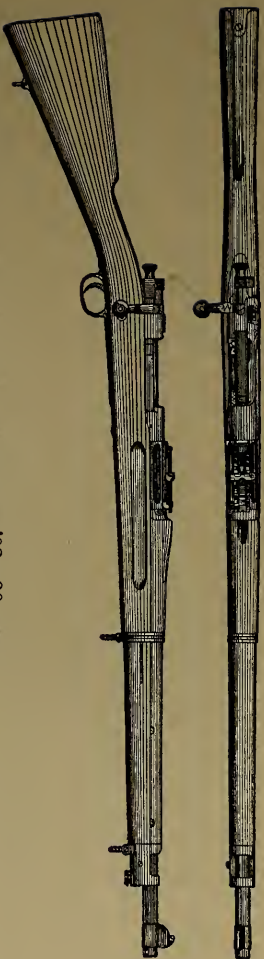
And what of the safety lugs on all this? For, obviously, the breech bolt and barrel *must* be pinned firmly together when the cartridge is going off. Here, for the first time, we come across the bolt lug, of which we will see no end in military rifles. Note, inside your Remington breech, two recesses. Into them fit the lugs of that breech bolt, when it is closed and you cannot see them. In opening, the first thing done is a cam motion inside the bolt, which rotates those lugs out of their recesses, and when you see them they are up and down instead of across the barrel. When the cartridge goes off it tends, of course, as in all rifles, to violently separate barrel and breech bolt. These lugs prevent it, but as soon as the breech bolt and cam mechanism overrun the trip below, the cam movement rotates the lugs and frees the bolt altogether.

We have space to go into two of the military sporting rifles, the .30 U. S. Army Springfield and the Ross .280. Both are wonderful big-game rifles, having a maximum striking power, minimum trajectory height, maximum velocity, explosive bullets and all the rest

of it. Of course, you mustn't have too many husky twigs in the way of these explosive bullets, or they will explode on the twigs instead of in the game, and the same is true of big, raw hip-bones and others too near the surface. Planted square, the bullets will do great execution, and if you do not mind having your meat full of little pieces of copper they are the latest up-to-the-minute idea on how to kill any large, wild mammal not as yet reduced to ownership and possession.

Mechanically, the bolt-action rifle is simply any big-game rifle with the lever part of the mechanism left out. Instead, you crook up your right hand, quitting the trigger guard to do so, and pull back the bolt, or, with rifle at shoulder, reach up to it with your right hand or else take down the piece and rattle the bolt as quick as you can, get her back to shoulder and get another aim—for, with most animals, while you may have hit him your first shot, the vitality of most of them is amazing and your deer is making good time to parts unknown, your ram about to run himself over a precipice where you will never get down to him in a thousand years, or your bear is crawling into lodge-pole pine so thick that a weasel couldn't make it on crutches—*and* your earnest desire is to stop him, quick, before he goes another yard!

Having eliminated the lever, to help us in the above, we have still the bolt. We might as well eliminate the hammer, while we are at it, and substitute a spring inside the bolt coiled around the firing pin. A knurled nut, which you can pull back if your fingers are not too numb with cold, serves to cock it, and a sort of wing which folds to right or left serves for a



THE SPRINGFIELD U. S. MILITARY RIFLE, MODEL OF '03, .30 CAL.



THE SAUER-MAUSER 8 MM.



THE MANNLICHER 9 MM. SPORTING RIFLE

safety, only on some of them one never can remember which side is "safe" and which "ready" in a crisis.

So we are down to the lug question again and this brings up the subdivision of straight line vs. flip-flop, for our way of releasing the bolt. The foreign rifles and the Springfield do the flip-flop, a turn up and a pull back. The lug may be cut to fit in recesses in the chamber, as in the Teuton guns, or it may have in addition a stop on the bolt with a piece of the frame jutting up for a backstop as in the Springfield.

The third lug is the rotary broken-thread screw, as exemplified in the Ross—Friday Folger's old 3-inch field piece breech mechanism over again! Pulling back on the handle of the 3-inch Navy breech block rotated the block free of its screw thread and the same swing threw open the piece for a new shell. Pulling back on the handle of the Ross bolt rotates the lugs, disengages their screw threads and releases the bolt free to come back. One less motion, a straight line pull instead of a right angle and then back. I cannot see that it makes much difference, as you have to take your hand away from the trigger vicinity with either of them—and get it back again—also readjust your shoulder and resight the piece.

Simple as the bolt actions are, their makers seem to have a genius for getting small and fragile parts out where they are vulnerable to unsympathetic rocks, and do not seem to worry about the numerous little nooks and crannies in evidence, easily choked up with sand, pebbles, twigs, and hemlock needles. Compared with the smooth-finished surfaces of regular sporting rifles, with hardly a crack visible in the actions, good

for any rough-and-tumble campaign in rocky, mountainous or forested country, these converted military sporters will stand a lot of cleaning up outside before being practical weapons. The original Miquelet flint lock had all its mechanism on the outside until some logical-minded Frenchman turned it around and sunk the works in the stock, and something like this ought to be done by the big rifle companies when they give us a bolt rifle made expressly for hunting big game. The Ross comes the nearest to being cleaned up of any of them at this time. Again, in the matter of their sights a lot of soldier ideas need to be adapted to rough country big game hunting. I had a fancy bolt sporter in my hands the other day, with half a pound of what appeared to be some sort of optical instrument on its breech, and a chimney full of good things on the end of its nose. I would hate to drop that rifle accidentally on the good old granite of York State, nor would I like to wade up to my neck in scraggs in Nova Scotia with it and expect to find the sights ready to see through at the end of the wade. Nor would it shine as a crutch in a ram stalk in the Cassiars, nor could it be laid in the alkali dust of Arizona with impunity. Yet we manage to drag our Winchesters, Rems, and Savages around in those countries without any particular care, with an occasional fall or a horse rolling on them, with mud and sand in the canoe bottom thickly spattering them—and yet when we pick them up they are generally ready to shoot, and keep on shooting as long as it is needful to work the lever.

CHAPTER III

RIFLE SIGHTS

RIFLE shooting for the woodsman is such a very different thing from rifle shooting for the military man that almost from the start it requires a totally different training. Summed up, the woodsman's training must enable him to hit swiftly moving game at comparatively short ranges. This game, deer, moose, elk or bear, will be going at top speed, except for possibly the first shot, and his progression will not be a straight line like a bird's flight but a series of bounds, and furthermore the view of him will not be against a sky-line but against a checkered gray background constantly interrupted by tree trunks, bushes, rocks and ravines. It takes the highest order of marksmanship to hit such a mark at 100 yards. Captain Carver, of glass ball fame, couldn't do it with any certainty, for it is infinitely harder than hitting balls and pennies in the air. Sighting and holding for woods shooting requires adaptation to the purpose intended and is entirely different kind of shooting than hitting a bull's-eye after a slow, careful aim at a long range target, which is the essence of military rifle training.

The sights of your hunting rifle are of the first importance, for more misses are due to inadequate sights

than anything else. A good sure holder, proud of his record on targets, and confident of getting into an eight-inch bull every time at 200 yards, will miss a real bull elk as big as a locomotive, clean, at eighty, simply because when he raises his rifle to fire he either cannot see the sights plainly and accurately against the dim figure of the game, or is unable to get enough time to refine his aim so as not to miss. Conversely the crack game shot will make a disgraceful score in a military match, thereby losing the last shred of his reputation. These things have happened time and again within the experience of all of us and it is generally traceable to sights and holding, nothing else. Both men will tell you that they "shot rotten," but as a matter of fact they shot as well as they knew how, and missed—because the game was a new one to them.

The sights of a rifle are like the lens and crosshairs of a surveyor's transit, the most important things on the rifle, for they are what you aim with. Lots of poor sights are sold on game rifles, most of them theoretically good, but mighty mean things to pick up a bouncing deer with. The most important is the rear sight, for it controls the whole aim. A plain flat bar, devoid of any notch whatever, is often advocated as the best rear sight on the theory that the eye naturally finds its centre, but the minute error that the eye is sure to make in locating that exact centre means a miss every time at any range at all. The flat bar, with a silver centreline, or mother-of-pearl triangle showing the centre by its point, is, on the contrary, one of the best sights made, for it permits exact centring

by the eye and at the same time has the great advantage of the flat bar sight, namely cutting off exact amounts from the front sight. For, any one can make a good line sight, that is, hit vertically above or below the bull (a sure miss with game) but it takes a marksman to make it an exact range shot horizontally, and this is easiest done by a rear sight that enables the front sight to be cut coarse or fine with accuracy and clearness of vision.

For this same reason all the deep notch sights are hard in the woods. On a target, in the open, they are very fine, for the aid they give in drawing down the bead into the centre of the rear notch, but in the woods, with the animal scratching gravel as fast as he can hoof it, you can't see the front sight in the notch with any clearness, so you raise it up in your anxiety to know that it is well centred and yet still have an eye on the game, hold low and pull trigger—with the result an overshoot. No, you want a rear sight that will let you see all around both sides of the front sight, will let you know by the amount of it that you are cutting off just how fine you are drawing, while the centreline on the rear bar gives your eye a centre to work to. A shallow notch in the rear bar, one rather wide so as to see lots of daylight on each side of the front sight, is nearly as good as a white centreline, for the eye quickly notes and corrects any discrepancy between the daylight on one side of the front sight and on the other. In a dim light, or wuzzy background, this advantage disappears and again we get back to a white centreline. This latter in its turn is not all heaven and angel harps, for if your front

sight is silver or ivory it will blur right in with the rear white line, making it hard and slow work to cut off just the right amount of front sight. The remedy for it of course is to stop the white line or triangle about a thirty-second inch below the top of the bar, giving you a black edge for a cut-off. Another advantage of this form of rear sight is that it will not let the front sight fool you and make you shoot "off the light." In the woods all square edged front sights and all beads show a light point or line of light on the side the light is coming from. As this shiny point goes down into the dim depths of a deep notch the eye naturally takes it for the sight's centre and you so hold, with the result of placing your bullet several inches away from the mark on the side opposite from where the light is coming. The flat rear bar lets you see this line of light in its true relation to the centre of the sight, and that so clearly that even in the hurry of a running shot at big game you will make no such mistake. When the sun is shining brightly, however, the flat bar sight is apt to have a mirage or glare on it and then its best substitute is a very wide notch, with knife edges to cut out glare, in which the whole front sight is seen. The eye easily lines it up centred correctly, and, for any shot, where you want to see all you can of the animal it is a very easily aimed and accurate sight. Both of these sights, mounted together on one slot-pedestal, both folding flat on the barrel at will, can be had in one combination sight.

Another theoretical advantage that does not work out very well in woods shooting is to have the rear sight as far back as possible, to get a long distance



OPEN SIGHTS OF THE .22 RIFLES AND SPRINGFIELD ARMY BATTLE SIGHT

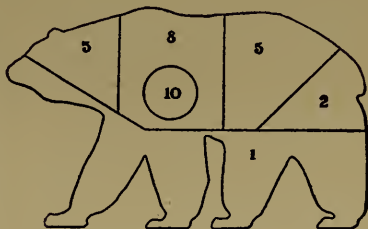


IVORY, GOLD BEAD AND GLOBE FRONT SIGHTS



ANTELOPE TARGETS FOR CELLAR RANGE

5 shots, 3 sec. time limit.
Half actual size.



CAMP-FIRE CLUB RISING BEAR TARGET

Length about 7 feet.



FOLDING BAR AND LEAF REAR SIGHT



FOLDING PEEP SIGHT

between sights. The advantage is discounted by the fact that the eye cannot then see both sights *and* the game, because the focus differs for the rear sight and the front sight and game. Front sight and game are both clear enough, because the front sight is so far away from the eye (about two feet ten inches) that it is as it were, in the "universal focus" of the eye, but the rear sight is a hopeless blur. To avoid blurring, two remedies are devised, the peep sight through which the eye looks, and the forward placed notch. The latter consists in simply placing the rear sight notch well forward on the barrel, eighteen inches from the eye instead of the old-time twelve or fourteen inches, so that it is quite clear and the eye sees all three things, rear sight, front sight, and game clearly, the rear sight being only a little blurred. With such a rear sight as the flat bar and centring triangle this slight blur makes no practical difference as all three can be seen with plenty of clearness enough to centre accurately and draw the right front sight, and for quick shots on running game in dim light its advantages far outweigh the disadvantages the short distance (sixteen inches) between front sight and rear sight.

Remains the peep. To my mind it is up and away the quickest thing to get a rifle on the game that there is. At first I used to try to centre the front sight in the peep aperture, and so lost many a good shot for lack of time. The last shot so lost was the rare great horned owl which I had a shot at on the Lumbee River trip. The owl that makes the familiar deep hoot in the woods at night is the barred owl, not the

great horned species, the latter being much rarer. This individual flew into a cypress swamp ahead of the canoe and my partner at the stern backed the canoe for all he was worth to let me get a shot at him. I whipped up the rifle and soon settled the bead on his breast, but the rear aperture did not exactly centre, and while I was adjusting this the canoe was whirling around, making me turn more and more to the left. Then tree branches got in the way, while trying to get the front sight on him, in true centre, in a clear view, and then the canoe turned so much as to permit no more corkscrewing of my body, and, by the time that was straightened out, the current had taken us much farther down stream and more trees intervened, so we had to let him go. Lieut. Whelen told me on one of his visits that any old centre with the peep sufficed, so long as you saw the front sight through it and had its bead on the game; even off centre well to one side would not make a difference of over an inch at ordinary game ranges. I knew that, with a small and distant bull's eye, centring in the peep made all the difference between "possibles" and an indifferent score, but a little shooting with the peep aperture more or less out of centre with bead showed that this difference was not enough to pay for the time wasted in trying to centre. An ordinary tang peep of 1-32 in. aperture will let you see a mountain goat at 100 yards entire, besides the whole front sight and part of the barrel it stands on, yet the total possible error in off centring will be less than 1-64 in. out of the centre-line of the barrel. The total throw of the bullet, then, would be $1\frac{1}{2}$ inches off centre at 100 yards. Using

this peep and paying practically no attention to the rear aperture one can slam the front sight on or ahead of the game just as quickly as arm can move and eye catch sight.

The only disadvantage of the peep is that in dim lights there is a perceptible interval before the pupil of the eye can expand enough to see through it clearly after being set for the surrounding illumination. Any big game rifle in which the owner puts his confidence should be well supplied with sights for all contingencies and there is no reason in the world why a couple of folding sights cannot be put forward on the barrel *and* a folding tang peep on the stock, giving the user open sights for quick sighting in dim lights at short range, and a tang peep for slow, accurate, long range work in any light or quick work at long range in good light.

Never depend on a peep alone. There will come many a shot when the light is so bad that no quick sight can be had with it, and not a few where no sight at all can be made. I have shot grouse over the open bar when it was so dark that only the dim black outline of the bird and the shadowy bulk of the front sight could be made out, yet it meant meat for the mulligan that very night. Have your peep either folding or flexible, if a tang sight, and raisable if a receiver peep, putting a folding leaf or bar sight in the old buckhorn notch so that it can be folded flat down on the barrel when the peep is in use. Do not try to have both tang peep and leave in the buckhorn, for the notch of the latter gets right into the peep line of sight and you are simply shooting

a buckhorn notch with restricted eyesight and all the advantages of the peep are at once lost. And see to it that these things all "work" properly; that the leaf sights are not so loose as to be continually falling back out of plumb, that the peep releases easily and does not stick anywhere, and also that it is lined up true, for, while it makes little difference if the front sight is not absolutely centred in the aperture, it makes a vast difference if the peep itself is not on the true centre-line. As they come from the factory those that I have used have been horribly out of true, requiring several shims of paper under their pedestal on one edge or the other to throw the peep aperture over on to the exact centreline.

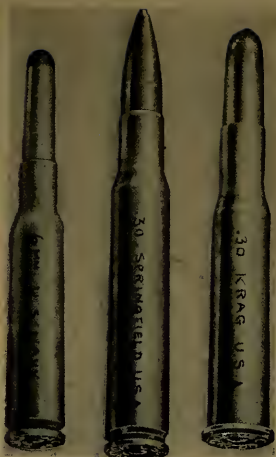
The choice of a front sight requires quite as much thought as the rear one. The military front sight, showing a black, square section to the eye, will give the user many a heartache if he hunts deer with it. Some sort of bright front is essential on game, for a black sight is lost against the dim coloration of the animal. The military sight is also too high, too weak and too movable for hunting purposes, and the steel shield that guardsmen carry to slip over it would have no place at all in the woods. I made a fair hunting sight out of the one on a Mauser that I once owned by filing a 45 degree flat across the upper rear corner of the sight. It gave a square, well-defined, bright bar of light for the front sight, one easily seen against dim brown and gray shapes, and one that would reflect skylight back into the eyes much later in the day than a bead could be seen clearly. Fred Vreeland, of the Camp Fire Club, applied this idea to a knife blade

hunting sight originally; he filed a long slant on the rear face of the sight so that it would reflect light back into the eyes, making it always a bright sight. The plumb vertical rear face seen on so many front sights is a deceiving thing. Swing the rifle around and note how the front sight goes from black as you face the light, through a shiny white line along either edge as you swing across the light, to full white when the light shines full on that plumb rear face. Any sight that makes all those changes is "too many" for a hunter to keep track of when the game is on the jump. I have obviated it on my two big game rifles by filing that same 45 degree flat across the rear upper corner, the whole face of the flat being only 1-16 inch. It presents a square, bright bead in all lights, no matter how you swing the rifle, because it reflects overhead light which is constant. I like it better than the gold and ivory beads because these are more or less weak, and the plain front sight is undoubtedly the strongest and simplest thing of the kind made. For those who prefer the bead I should think that the gold bead front sight would be the best selection, as it is strong, and shows up equally well on brown, black, or white game.

Having chosen the sights, the next important thing is the ranges you can get with them. A rifle sighted "point blank" at 200 yards will miss you a lot of game in the woods, for seldom do you get any such range, and you will always have to hold under to score a hit at shorter ranges. The average woods rifle shoots some such cartridge as the .30-30, .30-40, .303, .35 and .405, all of which will have about a six-

inch trajectory at 200 yards, that is, the bullet will be six inches high in mid-flight at 100 yards. Therefore, if you put the bead to break his shoulder or hit just back of the shoulder in the heart at 100 yards the bullet will go over him, even if you draw the front sight just right. There is no use saying that you will always hold under to allow for this; in the excitement of shooting at game you have a lot of things to think about, finding a clear space to shoot, getting the mitt off your trigger finger, getting the strap under your elbow if you use one, watching his jump, finding the right lead—if added to all this you have to do some lightning calculations for an imaginary spot six inches under where you have already figured, the chances are you will forget all about it or guess wrong, with the result of a miss. No; the thing to do is to see that the rifle shoots “point blank” at 100 yards and then hold high or draw coarse when you get a long range shot. Most hunting rifles are already sighted to hit where the bead or top of sight is held at 100 yards, but some field practice with them until you know just where your groups land is essential. A shot then offered at 75 yards or 125 will not introduce a sight error of more than an inch. Any fool can hit a vertical string, cutting it and bringing down the apple for the applause of the multitude, but now is the time to learn your front so nicely that you can hit a *horizontal* string!

Having gotten well acquainted with your rifle at 100 yards and vicinity, so that you *know* what she will do when you see your sights in a certain position,



THE U. S. GOVERNMENT CARTRIDGES



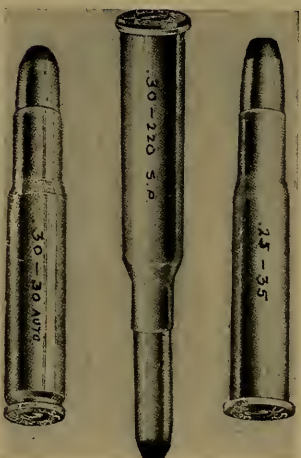
LOW
LEFT
SHOT



LOW
RIGHT
SHOT



SHOWING THE EFFECTS OF
CANTING THE RIFLE



FOX AND DEER CARTRIDGES



LOW
SHOT



TOO FINE
LOW SHOT



TOO FINE SIGHTING



CARTRIDGES USED IN "TWO RIFLES FOR
THE POOR MAN"



SIGHT
UPRIGHT



AS SEEN
THRU BARREL

CORRECT TARGET SIGHTING

the next thing is to provide for long-range work, 200, 300 and 400 yards. There are two ways to allow for increased range—see more of your front sight, or raise the rear sight a definite amount. All receiver peeps are provided with such a quick method of shifting the rear sight for various long ranges that it takes but a moment to push down the releasing lever, push up the frame to the required mark, and tighten the lever again. One can do it without hardly taking eye off the game, making all the changes with the hands alone and just glancing down to see the right mark for an instant while the thumbs finish the change. To do more than this it is hopeless to ask of a big game hunter, who, after a stalk of four hours around a great mountain rim is not going to risk his shot by monkeying with a burl nut or other complicated adjustment when he knows that any minute the ram or goat may wind him, or take alarm from some other cause and start to move while the rifle is being resighted. The quickest range shifting device is the combination of three leaf sights either on one base or three bases, any one of which can be pushed up with a move of the thumb, never taking the eyes off the game and never moving the rifle from ready position. The flat bar rear sight and straight front sight permit of very accurate cutting off of the amount of front sight seen to one who knows his rifle. The three leaf sights together on a modern rifle hardly involve a change in height of over a sixteenth of an inch, and any practised marksman can cut off a like amount from his front sight with a little practice at known ranges.

The tang peep is at its greatest disadvantage in this shifting of ranges. It has a burl nut on the sleeve and a locknut under this. You are to loosen the one and turn the other so as to raise the peep shank to a given notch cut on it beforehand; absolutely *too* much to ask of a hunter whose stalk is made and whose game is already uneasy or maybe running. The peep cuts off nothing of the front sight; you see all of it, the barrel and the game and a lot of the scenery besides. It is fine and quick within its range; outside of it your best plan is to *know* how much over him to hold the bead for longer ranges. A final thing that must be looked to on the tang peep is its position forward of the eye on the tang. With the kick of such a powerful weapon as the .35 Winchester, for instance, the least distance it should be forward of the eye to prevent its being kicked back into the eye socket, or else strike your frontal bone is $2\frac{1}{2}$ inches. This will clear for offhand and sitting positions; prone, your head is so much farther forward that it will surely come into your eye and you must hold your head back to allow for it. Many of the flexible tang peeps are set so far back for the particular rifle for which they are sold that they will come back into your eye anyhow; the makers were evidently so much more interested in dodging the breech bolt with their precious sight that they gave no thought to the shooter's optic. However, a good tang peep is such a joy for quick and accurate shooting at anything near its normal range as to be worth some trial to find the right peep for your rifle. The one sold for the model '94 Winchesters fits the model '95, .35 calibre much

better than the one sold for that rifle itself. I would not shoot the latter for the sake of my eyes, as it sets the tang half an inch farther back than the one for the model '94, and this latter one is only just enough forward to clear your eye when the rifle kicks back. For a larger man, with heavier bones and more flesh on them this would not be the case, probably, but when you do get a tang peep see that it has not this fault, and if it has, look over the stock in trade and pick out one that sets it further forward. Never mind the bolt running into it; it makes not the slightest difference in the action, and the flexible feature of the sight is for that very purpose of rolling back when the bolt passes over it.

CHAPTER IV

AIMING AT BIG GAME

WE now come to the important part of holding in big-game rifle-shooting. You read much of making a human tripod of yourself, to get steadiness, and probably wonder why so much stress is laid on it when most of the shots you had required a swift, easy swing rather than any steadiness. What you really need is a sharp eyesight and a prompt, accurate trigger-finger. Any trigger which "creeps" is out of the question for woods shooting. You want an instant release, of not over four pounds trigger pull. All the military "dodges" for a steady, rock-like foundation on which to base your shot are "nix," but of course should be learned, as there will be long-range, still shots in which they will be useful. But the shooting that you will use far more is a swift swing of the rifle on or ahead of the game, and a quick, simultaneous trigger-pull the second that the bead is where you want it. Such great game shots as Lyman and Walter Winans insist on this training as the only one. I personally have found use for the military system, and expect to use it a good deal more, especially in mountain work, as time goes by. But, even after the first shot is thus expended and a hit scored, even a mortally wounded animal will in most cases start off at top

speed, and it's up to you to hammer him as long as you can see to shoot. The quicker he is down to stay the less your chances of losing him are. It's no fun to try to find a deer a hundred yards from where he stood when you put in the mortal heart shot; he may have gone almost anywhere and left no great amount of blood behind to give you a clue. Mountain game is even worse, for it has an engaging habit of running over precipices and rolling down slopes, breaking its horns, and staggering off to places where no one but a fly could crawl down to it, to let you miss him much after the first shot. And then you are right back to the woodsman's art of chucking it to him as he hops, with a rifle. No; cut out that Guardsman stunt of holding the fore-end on the tip of thumb and forefinger; get a firm grip on fore-end and tang, and learn, first of all, to shoot standing up in any old position so that you soak it to him at the instant that the bead is in the right place. It is not hard. Four shots out of five into a standing deer as big as a rabbit at 75 yards is a score that any deer-hunter should make easily if he is going to go after them in the woods. Personally, I never found any gain by holding longer than it took to swing the rifle on the mark and fire. To wait longer would be simply to swing it back and catch another sight, so why not let off in the first place? A military man, not used to this style of shooting, is of course at a great disadvantage when you begin to speed him up. Shooting against a "crack," on fifteen seconds time limit, I once ran up a score of 85 against his 56. He shot his first ones as fast as he could aim, with the result that they all

went wild, and then got off the rest of his shots at about 4 seconds each, scoring a few bull's-eyes, but both in number of bull's-eyes and total score my huntsman's way of aiming had it on him. Give him plenty of time and he would have made every shot a bull's-eye, but what good would that have done him with a deer in the woods? I have made my best "possibles," ten successive bulls, by just swinging the sights across the bull and letting drive as I crossed, and never could equal them by slow and careful holding. The point is that it is just as accurate as the slower method and infinitely more serviceable on game; in fact, it is the only practical method on game.

Therefore, begin at the start with moving targets at close range. A pendulum tin can, a blue rock thrown in the air will teach you more woodsman rifle-shooting than any amount of range practice. Learn, first of all, just how much of your front sight seen means dead in the mark, and then always see that much sight when you lay the piece. Next, plant it on the mark, or, if it is moving, ahead of the mark the right amount, and let off at once. That's all there is to it, training of the trigger-finger to let off, the arms to hold the rifle sights in line, the eye to see the mark and the sights at the same time. A barrel rolling down hill, a cardboard deer, bear, or rabbit hung from a trolley wheel, running on a taut wire with a slant to it like the cash runways in a department store, cans and blue rocks tossed into the air—these are the marks that count for real training. I quite agree with T. S. Van Dyke, the still hunter, in his remark that what the woodsman needs is the ability to hit a three-

inch bull at 40 yards every time for ordinary work, and the same at 75 yards every time for proficiency. Any one that can do that on three-second time limit with no misses is good enough for the woods. Military work begins where the huntsman leaves off, and requires a different training. At that, they should provide for quick, accurate firing during a charge or mêlée when the ranges are close and two seconds is the most that any one should have to aim and fire.

A miss is as good as a mile. What counts in hunting are the hits only. There are no 4's and 3's to help along the score, and therein is the danger of target practice. One gets contented with a string of fours, all of which are misses, and the other fellow with his bull's-eye may lose to you because of a wild 2 or a mean 3, in spite of the fact that he hit and you did not. Your total striking circle in a deer is about 16 inches, 30 in elk, moose or bear; get the notion that it is either to hit inside of that or not at all. Every running animal has to be led; not right ahead of him, but above or below him, depending upon whether he is going up or down in his bound. An elk's back will rise ten feet in the air in mid-jump, a deer about six feet; if you fire then you will most likely overshoot as he will have come down from two to four feet while your bullet is getting there, so try to get him coming down, and hold low and in front. About two feet in a hundred yards is none too much. Like the wing-shooter, you can cut this down a bit by getting the knack of flipping the rifle ahead as you pull trigger, it then gets its lead while the hammer is coming down. To get to know your rifle with this kind of

shooting takes practice at moving marks, and not slow ones either, but marks going about twenty miles an hour at least. That is going about fifty feet a second, yet many of your shots will be at this speed and will need lots of holding ahead and lots of practice to know how much.

After climbing a steep slope or running fast to make a quick detour you will be sweating like a bull, and your fingers will be slippery and cannot grasp the fore-end with any firmness. For this reason checking on both tang and fore-end is essential; if you bought your rifle plain, do it yourself with a checking tool which you can buy from the sporting-goods store for fifty cents. Or have the local gunsmith do it; but never omit it.

Again, when tracking elk or deer in the snow, be careful about letting your right hand get numb or sluggish. A finger-mitt is no good for the actual shooting, it is far too clumsy, and you cannot feel the trigger sensitively through it. I lost a fine shot once, from this very cause. He had been watching me, and suddenly burst into a dead run about seventy yards off. I had no time to get off the glove and so fired with the mitt on. The rifle went off before I was ready and I overshot. I was just drawing the front sight fine when it fired, and I knew I had missed. A friend of mine lost a deer from numbness because when he started the deer he found that his hand, only a short time out of the mitt, was so numb that his thumb simply would not raise the hammer. He wanted it to, all right, but there was nothing doing with the thumb! The best way is to carry your rifle



WINCHESTER REPEATING RIFLE, MODEL '95
Box Magazine



WINCHESTER RIFLE, MODEL '86
Tubular Magazine

in your left hand and keep the right bare and tucked into your coat or shirt, on your breast so that it will be warm and ready to use instantly.

A rifle strap is essential in the western mountains. In the eastern woods it is more or less of a nuisance, unless you use it in firing. I do so, and find that it not only gives you steadiness, but checks that wild impulse to jerk up the rifle on sight of game. The rifle must not be jerked up; raise it slowly, taking the time to align the sights so that they will fall to your shoulder practically trained true. My strap is just long enough to slip my elbow into, and when the piece is at shoulder the strap is taut and helps hold the rifle firmly so that one can swing the sights without wobbling. In raising the rifle the strap drops naturally around my elbow, and as it comes to shoulder it begins to set fast. In a cross wind it is the only thing, for the amount that a gusty wind will wobble a well-held barrel is almost unbelievable. For that reason avoid a standing shot where the wind is heavy. The strap should be wide and soft, tapering down at each end to an inch. The bronze swivel buckle is the right one for the fore-end, for, in running from it over your shoulder, the buckle swivels, thus feeding the strap flat on your shoulder and not at a twist as it would do if the buckle were merely hinged. A hinged bronze buckle goes at the lower end of the strap on the stock.

Your rifle is your hunting companion, your best friend, and the heart of your trip. Pick out the one that you fancy and then stick to it, learning all about it, "dolling it up," with sights and straps and checks,

everything that will make the weapon more efficient. Every man has his own pets; I will describe my three and their sights, not that they are a model for any one else, but to give some idea of the practical considerations that went into their selection. My western rifle is a .35 Winchester, Model '95, a cheerful young cannon with a knockout punch. She weighs but $8\frac{1}{4}$ pounds for all that, and has a handsome stock with checkered fore-end and tang. I owned another just like her, only plainer, for some time before I was sure that she was *the* rifle for me. She has a plain front sight with the 45 degree filed across the rear upper corner of the knife; a combination wide notch leaf and flat bar with pearl triangle sight on the barrel, and a flexible tang peep on the tang. I use the tang for most shooting, the flat bar for all short-range shooting, with the .380 supplemental in the Marble-Brayton steel auxiliary cartridge for small game met on the trail. Rifle No. 2 is a .32-20 Winchester Model '92, for eastern work on deer and hiking trips where you want a good, all-around rifle that can get squirrels, woodchucks, ducks, etc., with the .32 S. & W. short, and the H. V. cartridge for deer and long-range shots at fox, duck or hawk. She has plain front sight, filed; receiver tang peep, and folding wide-notch leaf and flat bar. The receiver peep is raised out of the way in dim light and the other sight used; otherwise I use the peep entirely, for quickness and accuracy. Rifle No. 3 is the Kid's treasure, also my own. It is a .22 Stevens Favorite, shooting all the .22 cartridges. It has a folding tang peep, and combination globe front sight,

giving a ring-and-pinhead or ivory bead at will, and the barrel sight is a folding wide-notch leaf. The latter, in combination with the ivory bead, is the general choice for game, the tang peep and pin-head for long-range work. With these the Kid once made a 44x50 at 100 yards, and I had to make a 47 to keep him from trampling all over me! All three of these rifles are some busy, and they suit us a whole lot. And this last is a quality in a rifle by no means to be overlooked. Do not stop with a weapon that you are not completely satisfied with.

CHAPTER V

TRIGGER RELEASE

IF you will stop to consider it a minute, the release of the trigger is the gist of rifle-shooting. If the hammer falls at the precise instant that the rifle is sighted on the mark, a hit will be scored, and this up to about as far as one can see to shoot or hold, with modern flat-trajectory, high-velocity rifles. The matter of a perfect trigger release is, then, something for each individual to study carefully and practise at until it becomes second nature. Most beginners will recall that, in sighting a rifle, their attention was first centred on finding the mark, next on holding on it, and then finally on letting off the trigger. By the time this last had been successfully attended to, the holding had been forgotten entirely or else left to haphazard. Such is one of the tribulations of the beginner in rifle-shooting.

Another is that of hard trigger release. Some rifles are sent out with absurdly heavy trigger pulls, and the unfortunate beginner, after getting all through with his aim and being at last satisfied with the holding, presses the trigger only to find that it refuses to budge without displacing the aim. He next yanks nervously at it, while the rifle sights do a swing around the three ring, but still no report. Then he

calls up all his reserve concentration and tries to do two things at once—holding on the bull and releasing a trigger by main force—two major operations that would tax the abilities of a veteran! And in no form of shooting is the light trigger release of more importance than in the revolver, for here it is virtually impossible to make consistent scores with a hard-pulling trigger.

Again, there are many rifles with a creeping trigger. These are fine for target work, but require special training to use with big game. The creep reaches a definite end, which the sensitive trigger finger can distinctly feel, after which a little added pressure releases the bolt firing-pin (for it is in the military rifle that one encounters this form of trigger release the most). For target-shooting we have no quarrel with this release, as one concentrates on a steady hold at the instant the end of the creep is reached, but with big game, especially deer on the move, it is difficult to use, for the release is not instantaneous and there is no time to feel for the creep, and if you have trigger-finger mitts on you cannot feel it anyhow, and must release without knowing just when the rifle is going off. With pistol-shooting the creep is still worse, for here you *must* have an instantaneous release. Once I was in a match where a fine, high-power, foreign pistol was the prize, the shooters using the pistol itself in the competition. In that match were some of the best pistol and revolver men in the ranks of modern sportsmen, yet none could make a decent score and the prize went to about the most erratic shot in the bunch. That pistol had an awful

creep. You found the bull and then let off; that is, you thought you were going to, but all the response your trigger finger got was an infinitesimal amount of creep. This was repeated several times until when the pistol finally went off it was unexpectedly and your bullet might land anywhere.

Modern big game rifles, exclusive of the converted military sporters, are all instantaneous release. The trigger pulls vary from 2 pounds, which is about as light as it is at all safe, to 7 pounds, which is far too heavy to do good shooting with. My own rifles, the survivors of a very extensive collection, for I have cleared out most of them so as to really know the ones I use constantly, vary from 3 pounds trigger pull, for a target Stevens, to $4\frac{1}{2}$ and $5\frac{1}{4}$ pounds for a medium power and high power big-game Winchester, respectively. Of these the 3-pound pull is undoubtedly the nicest to let off, albeit you have to get used to the sudden way it lets go when, perhaps, you are not quite ready. For forest work, on big game, I should consider this pull too light and too apt to premature. For small game it is just right, as you need fine shooting for them and usually get an instant to aim in when the animal is still. The $4\frac{1}{2}$ -pound pull is noticeably heavier, enough so to take your attention away from the aim, until you get used to it. In all trigger release your mind should be concentrated on the aim, the trigger being attended to subconsciously, the same way you see something else out of the tail of your eye when concentrating your gaze on a particular object. Yet you have considerable nervous excitement to allow for in the shooting of big game,

and will find too light a pull will always result in more prematures than you would like to remember. Again, your shot may come after a great deal of violent exertion, running hard to get to a vantage point, executing a difficult stalk, climbing hard or worming your way through difficult underbrush, and your heart will be pounding so you can hear it, with your mouth open, and your muscles will be in anything but a calm state. Under such conditions too light a pull, such as for cool target work, will result in your undoing. Four and a half pounds is as light as I would care to have in the woods, and such a contraption as a set trigger, with extra hair-trigger, would cost more tribulation in trying to manage it properly than it would be worth.

My heavy big-game rifle has a $5\frac{1}{4}$ -pound pull. There is plenty of good reason back of this, too. Consider that you have a number of things to provide for besides hitting your game. The recoil in a high-power rifle of this calibre represents about 2200 foot-pounds, and you must hold it firm and solid against your arm, cuddling it well in on your chest like a shotgun. The right thumb must be laid over along the tang, not curled over it, or it will take your nose off, the kick will be severe, so that your grip on tang and fore-end is hard and firm, and altogether the muscles of the hand are under considerable tension. The trigger finger has a long hook to make, and so can put on considerable pressure without conscious effort. Finally, I use a sling, not the military kind that requires several turns of your arm and shoulder in it, but the rifle carrying strap is of such a length that it will

just come taut when your left elbow is crooked into it and the piece pressed to the shoulder. This is a tremendous aid in steadying the rifle in a cross wind and making your holding come easily to rest. I wouldn't be without it for worlds, and, of course, a rifle without a strap in two weeks of wood cruising is a sorry thing, so why not have it of the right length to aid in aiming? This strap introduces tension of its own, and once I let off prematurely while crooking into it and swinging the piece up. It cost me a high place in the deer match at a Camp Fire Club outing, as I already had three nice shots in his brisket, but didn't know it, as the deer matches are not scored until the string of shots is fired. No, I am perfectly satisfied with $5\frac{1}{4}$ pounds on that rifle, and would not change it, more especially when I think of possible shots fired with a woolen trigger mitt on the hand, for more than once I have had to fire in bitterly cold weather when there was no time to even pull off the mitt.

In revolver work, as I have said before, the soul of it is the trigger release. Two pounds to two and a half is ample; any more will handicap you unmercifully. Good revolver scores are the result of a steady arm, a cool head and strict attention to detail—that is, seeing to it that your holding is correct when the hammer is coming down. So many shooters do fine aiming and then lose all control at the instant of firing, with the result of an erratic group. When you see such a group, question the shooter and you will find that he does not distinctly recall just what he was doing at the instant of release. A good re-



A PARTY OF BEAR HUNTERS

Rifles used, left to right: Savage '99, Winchester '95, Marlin '93,
Remington .35 spiral magazine, Winchester '86.

volver man can call his shot just like a rifleman—that is, he remembers just where his sights were at the instant the revolver went off, and that shows that he was on the job all through the aim, and not willy-eyed after the brain order to release went into execution. All this presupposes a trigger release that will be light enough not to communicate its disturbance to the muscles holding the pistol, and this is got around two pounds. I have seen many good guns that went as high as four pounds, and the average is three. Better lighten to two if you want to make fine scores. And the checked trigger is another feature of great use on a revolver. It distributes the weight of your finger flesh evenly over the surface of the trigger, so that the pull does not have to be concentrated at any one point, as in the bend of a smooth trigger. It makes a very noticeable difference in the ease of pull, so order a checked trigger with your gun when you get it, and make things just as easy for yourself as possible. It is worth the money and pays for itself in the ammunition that you will save in getting to be proficient.

Among my shotguns, the boy's 28-gauge has a 5-pound release; the hammerless 12-gauge double, 6 pounds in both right and left, and the 12-gauge old hammer gun that I use for ducking in the salt marshes has 7 pounds for the right and 6 pounds for the left. These pulls are about right for their separate uses. For a boy's hand, 5 pounds is heavy enough, yet it requires a firm pressure to let off, and for a man's strength, 6 pounds is nice. Seven pounds is a trifle too heavy, but in the muscular work of fast gun-

swinging and gun handling you do not want anything light and apt to premature. Shotgun trigger release is, of course, instantaneous, the point of the trigger sear lifting directly out of the notch in the hammer without any intervening leverage as in military rifles. In consideration of the vast influence the trigger release and hammer fall have on one's swing, it must be practised until eye and trigger-finger work together as subconsciously as in golf form or any other matter of muscular skill. A man with a poor shotgun trigger release will make a most erratic shot. Even assuming that he swings alike each time, and that the birds are as regular as a clay pigeon on a calm day, he will miss a lot of them through slow or fast release.

Trigger-finger training is, fortunately, a most inexpensive amusement. With rifle or revolver it simply needs a tack head in the wall of your room or a mark out in the yard reduced to correspond to given long ranges. Daily practice on these costs nothing and trains two things—the set of muscles that hold and swing the rifle or revolver, and the trigger finger and eye partnership that lets off at the mark. You will score mentally many a miss before you get so you think you are hitting them freely. Then real practice at a range will show you up some more.

In nearly every armory they have an improvement on plain sighting practice, also very inexpensive. It consists in a Springfield, hung in movable tongs that are connected up in such a way with the mechanics of the target that a small pointer registers a hit on the target when you pull the trigger. This is good prac-

tice for the trigger finger muscles and each shot is scored instead of being guessed at.

When the rookie is making possibles on it every other string, he thinks he is a sharpshooter, but a trial out on the ranges with real ammunition and real wind will show him that he has only trained his trigger finger and is only a mediocre shot after all. But this training must be gone through with to get even to that stage, and I would consider not less than fifteen minutes a day as necessary during the month of August for every one who expects to hunt big game in the Fall. The same thing with the revolver, for it is the handiest thing ever for small meat-in-the-pot along your big-game trail, especially in the West, where one is on horseback a good deal of the time.

For shotgun, I do not believe that any one can become a really consistent shot without a great deal of practice in gun swing and trigger release. A good deal can be done swinging on a small bird or mark in your room, but what counts is work at the traps. For most of us it is not until several thousand shells have been fired at one shoot or another that one gets that fine timing of swing and release that gets bird after bird until your total runs from twenty-one up to twenty-five straight. I have not reached the latter yet, but manage to land somewhere between twenty and twenty-three with considerable regularity—on calm days. On windy ones, only the cracks can connect with any consistency, and I've seen a lot of them drop down in the eighteens when the breeze was hopping the saucers about so they weren't there when your shot got out there.

In conclusion, let me urge the tyro to pick out a good medium pull and not change it until he has a lot of experience. There are thousands of gun cranks who pick a gun to pieces the moment it gets from the factory—but not you! The men who made these guns have been at it for some time, and they know from long experience just what is best in the long run for all the conditions that you and your gun may have to face. So don't rush in and change everything for some fancied advantage until you are sure that the advantage will outweigh the disadvantages that may come up under other conditions. Experience will tell.

CHAPTER VI

RIFLE TARGETS

AUTUMN is the time you begin to reach for the good old double shotgun, your pet rifle, or both. You find to your horror that the beloved rifle is more rusty than trusty and that there's actually a speck of dirt—several of them—in the barrels of the 12-gauge. Then comes the Annual Overhauling with screw-driver, kerosene, hot water, nitrosolvent and gun grease. After which, the irresistible longing to shoot. The fisherman has had his day and is gone,—it's your turn now. It is yet thirty days to the Hunting Moon, but a few practice "aims" set you breathing hard and you realise that the particular muscles that hold a gun are flabby and soft. And right here is where the little 35-foot cellar range comes to the rescue. After you have fired not one hundred and fifty, but five hundred and fifty shots in the cellar range, often in strings of fifty, your holding muscles are hard and steady, the piece lays to the shoulder in good alignment and all there is left to do it to choose how much sight you are to take, swing into the bull's eye and fire.

I do not advise the inevitable .22 for this sort of practice. It is too light and too different from your regular hunting rifle. If the latter is a large high-power, use a sub-calibre steel supplementary cartridge

adapted for .32 c. f., or better still, own a .32-20 or .32-40 low-power repeater such as was in universal use and good enough for everybody in the '90's. Personally I believe that, except for moose, caribou and Rocky Mountain big game, either the .32-40 or .32-20 H. V. sixteen-shot repeater is the safest and best rifle for all around Eastern and Central States shooting. With its full-power 115-grain bullet it is deadly for deer and bear, and from that down through the range of .32 cartridges it takes all the smaller game, winding up with the .32 short for ducks, grouse and squirrels.

Using the .32 short S. & W. pistol cartridge, smokeless, you have an excellent cellar range load. Supplemented by a few afternoons outdoors, guessing distances at all kinds of marks with, say, three sizes of cartridge, you will find that the cellar range puts one in surprisingly good form for field work.

After getting so that you can depend on yourself for a 22 or a 23 regularly with the standard pistol target, you have got all the benefits possible without increasing the range, and it occurred to me to give the cellar practice variety and novelty by approximating big game conditions as follows: I cut out of a magazine small pictures of running antelope and mounted them by twos on cardboard. At their size of $1\frac{1}{2}$ inches high by $2\frac{1}{4}$ inches long they were equivalent in the cellar range to the real beast at 250 yards. Over the sights of the rifle they looked like little gray ghosts, and the stunt was to fire five shots on three seconds time limit each, head shot to count 5, head shot 4 and body shot 3; or 5 for each if intention-

ally aimed. The illustration shows a couple of 20's made under those conditions.

You may scoff at the 33-foot range, but the English use 21-foot standard indoor with proportionate targets, and don't find it all beer and skittles, at that. I append an interesting letter from E. C. Crossman, the famous gun authority, on the English indoor practice air rifle. It appears to be some gun and well worth trying out over here.

Dear Miller:

Some class to the targets, sure enough. Betcha the N. Y. police don't know about that cellar range. Me, I'm classy, I shoot in the parlour, not in the cellar. Got an English air rifle, made for target work and of the pattern used by over 300,000 riflemen in the right little, etc., isle. Weighs 7 pounds; has good walnut stock with checked grip, pistol shape, trigger adjustable in pull, barrel .17 calibre and carefully rifled, rear peep sight, front tip over, middle sight if desired, both adjustable for elevation. Compresses with one stroke of lever lying under barrel, will drive bullet through $\frac{1}{2}$ inch of pine at 50 feet, and will make group of $\frac{1}{2}$ inches or less at 75 feet. Cost of bullets, 12 cents per thousand in England. I've got a bullet stop, bought from same country, steel octagonal box with four inch opening in which target is set, behind this is V-shaped steel blade that deflects bullets to sides of box and prevents lead from splattering backward or falling out of box. Little noise, no smell, no expense. Standard English range 21 feet, targets reduced proportionately from outdoor pattern.

Target holder hangs on wall and I shoot it from my den. Sample bullet is enclosed herewith. Open end is toward air, expands and takes rifling. Many neighbors' chickens have left home in A. M. and failed to return from regular raid on to my property. On dissecting those that have thus failed to return I find that the bullet drives clear through the beasts until it hits a big bone. As a cat discourager it is fine. It is, of course, hard on the cat, but I cannot find any sympathy in my heart for the miserable bird-killing beasts.

Did you shoot five shots in three seconds, or one shot? Latter is some quick shooting if so, while five shots in three seconds with that sort of aim is rather unbelievable in this locality.

Yours very truly,
Los Angeles, Cal. E. C. CROSSMAN.

This three-second time limit is a mere pipe. Robinson, in his article on Aiming, points out that riflemen seldom realise how quick the eye is. Once your sight is drawn and you are on the bullet it's time to let off, as there is little to be gained by holding longer and wabbling about the 5-spot in hopes that you can stay there long enough to make a brown-study of it. My own practice is to draw my sight in the immediate neighbourhood of the bull, swing into it and fire in that fleeting instant when the bull either sits on the sight or is to the right or left of it, depending on windage to be allowed. The count of three is ample to align the piece, draw the sight and walk into the bull. Any longer time is simply doing it over.

To make a cellar range requires no elaborate outlay at all. Simply a wooden box from the grocer's, filled with sand, dirt or even stove ashes. Then you want a hundred twenty-five-yard standard pistol targets with 1-inch bull, $3\frac{1}{4}$ -inch four-ring and 5-inch three-ring costing a dollar a hundred. They will do to start with, but to be in the right proportions with outdoor 200-yard targets you should get up a target with $\frac{1}{2}$ -inch bull, $1\frac{1}{2}$ -inch four-ring and $2\frac{1}{2}$ -inch three-ring. Send this to the nearest job printer and he will make a line cut out of it and run you off a thousand for a couple of dollars. For outdoor practice the Standard N. R. A. 200-yard target is 8-inch bull, 26-inch four-ring and 46-inch three-ring with a field 48 by 72 which counts two. All cellar range practice should be supplemented whenever possible by a day or an afternoon a-field. Dig up out of catalogues the trajectory of the various cartridges you are using. It is essential to know them approximately, for at all close ranges you are apt to overshoot unless you are familiar enough with your cartridges to make a fair allowance.

With point-blank at 100 yards your bullet lifts, say, 3 inches at 50 yards, $1\frac{1}{2}$ at 25 and $1\frac{1}{2}$ at 75. Raise it a notch to 200 yards point-blank and the lifts for the same cartridge will be approximately 6 inches at 100 yards, 3 inches at 50 and 3 inches at 150. In Chapter XV we have a table of trajectories which you will do well to study, and then work them down to practice in sight-drawing afield.

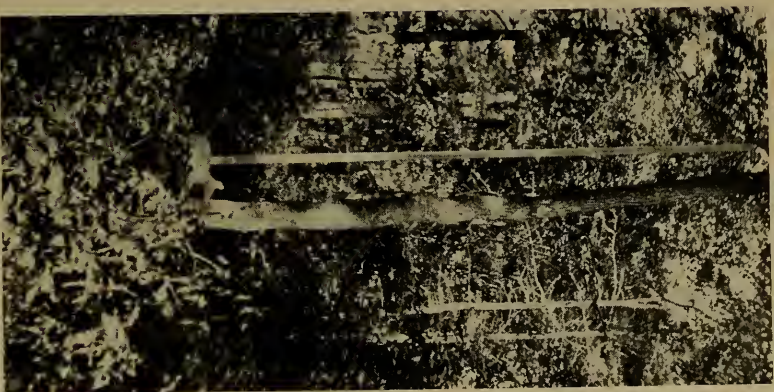
Quite by accident I discovered a means of getting a world of fun and good practice in rifle shooting—a

running deer target that can be made in half an hour and will go a long way toward surprising you out of any notion that such an animal is easy to hit. We have a running deer at the Camp Fire Club matches similar to the animal at Bisley, the Camp Perry matches and at Los Angeles. He speeds along at the rate of 75 feet in six seconds, and not a few men in the club make "possibles" on him, that is five shots forward of his centreline. I myself have hit him four out of five at 100 yards, which score put me down ninth or tenth man, as two of them were haunches counting only 7, whereas the brisket shots count 10. The speed of the Camp Fire deer is about 8 miles an hour, which is what a deer will do through timber when not badly frightened, the kind of shot you get when "he won't stand still." How fast it really is, you do not appreciate until you get at close quarters, but it is in any case the real thing for big game rifle shooting practice, and many a sportsman on his way to the annual deer hunt would give a lot to have a day or so at just such a target.

The deer that figures in these illustrations is proportioned for reduced ranges, being 20" long from nose to tail, 13" from haunch to brisket and 5" through the body. He was cut out of brown cardboard and first used standing, firing at 50 and 75 yards, only the first shot being allowed on three seconds' time. All the rest had to be got off just as fast as the lever could be worked and a sight taken. Practically all the army method, of slow, careful sighting, with the front sight travelling around the bull until that instant comes when the bull sits squarely over



THE CAMP-FIRE CLUB RISING BEAR
Range 100 yards. Note blend with background.



THE AUTHOR'S PENDULUM DEER
Speed 18 feet a second.

the sight for an instant and the trigger is squeezed off, is worthless in big-game shooting. Its sole usefulness is when you have a long-range shot at an unsuspecting animal. After that shot all the rest will be fired as quickly as a satisfactory sight can be had, for that animal will rarely drop in his tracks; even if mortally hit he bounds forward and may run a hundred yards unless stopped, and any other hit will simply set him and you off on the long wounded-animal trail—unless you can knock him down to stay before he gets out of sight. Now the eye is quick as a flash, and the arm muscles, if well trained, will bring the rifle sights into line with the raising of the piece; it is only the brain and trigger-finger that are slow. If the rifle is not fired the instant the eye sees the sights on a vital spot on the animal, a second sight must be had, and still another and another until the trigger-finger does its duty. Meanwhile the animal may move, or, if moving all the time as deer and bear are often encountered, there is no time to get any sort of a military sight.

With this deer, a party of four of us that were going to Maine and Pennsylvania after deer practised with the idea of getting used to dull brown targets, the shape and vital parts of a deer, where to put the bead quickly where it would do the most good, and how to work the magazine quickly and smoothly, a feature that many big-game hunters overlook until the time comes when they want that whole magazine as quickly as it can be fired.

One man brought a .30-40 box magazine carbine; the second a .30-30 tubular magazine; the third a dou-

ble gun, one barrel a sixteen gauge and the other a .38-55, while I used my old favourite the .32-20 W. H. V. In addition to the deer we had a brown fox of about actual size, a profile snowshoe hare and a profile grouse, both full size and intended to be fodder for the supplementary cartridges of these rifles. The .30-40 and .30-30 used .32 S. & W. shorts in a steel supplementary cartridge, the .38-55 had reduced armory cartridges, while I had a pocketful of .32 S. & W.'s which can be shot direct in the chamber of the .32-20 without any supplementary cartridge at all. The deer was tried first at 50 yards and then 75, five shots being fired in a string, the first being a three-second aim and the rest as fast as the magazine could be worked. The honours were carried off by the .30-30 and .32-20, my own gun landing four out of five of the 50-yard and all five at the 75-yard range, principally because she was completely sighted in, had a receiver peep with large aperture, and I knew her of old. The other men were still in the stage of getting acquainted with their new rifles, the .30-40 man having just bought his and putting most of his shots high, and the .38-55 landing nearly 8 inches above the deer until he had had a short but earnest session with his sights. After that things were smoothly enough, though I do not remember a single magazineful that went off absolutely without jamming. This was due, for my gun, to dirty and uncoiled magazine action, a part often neglected in favour of the bore, and on the larger guns often to not throwing down the lever full length. Working the magazine is just as much a practical part of rifle shooting in the woods as firing the gun—yet how many

sportsmen spend any time at all running through a few magazinefuls until they get the hang of it!

But both the deer and the fox were rather disappointing. They were too easy; they did not run the way game does, hit or not. The score stood for the deer: .32-20, nine shots; .30-30, six shots; .30-40, four shots; .38-55, none. On the fox at fifty yards everybody was in with from two to four shots apiece; the grouse had his neck cut off by all the supplementaries at thirty yards, and the rabbit was all shot up at forty—there remained no more worlds to conquer. Then the Big Idea hit me; why not rig up a pendulum deer?

I tried it out next day at home. I had a 14-ft. strip of two-inch white pine moulding, and to this the deer was tacked with a thin cross piece behind him to keep him from twisting under air currents. At the upper end of this pendulum went a wire nail driven into a broom-stick handle, which latter was nailed to a tree some sixteen feet above the ground, bringing the deer's back 2 ft. 10 in. above the forest floor. Next, a file weighing about $1\frac{1}{2}$ lbs. was secured in behind the strip of pine for a weight, and the deer was ready after not over half an hour's fixing up. His first big swing was 18 feet and he did it in two seconds as timed by a stop watch. Going 18 feet a second in mid-swing he was some hard to hit, and gee! but that was an exhilarating sport! It had all the joyous fascination of wing-shooting, and it was the nearest thing to real big-game shooting, particularly Virginia deer, that I have ever experienced. The Kid and I took to it with real enthusiasm and estab-

lished a score of two hits each out of five for a starter. As the shooting was done inside of city limits we used a hard-hitting, accurate air rifle, and reduced the range to 25 yards. The rules were that each swing counted a shot whether you shot or not. During the back swing you had to work the magazine action and catch your sights; no shots were permitted except at the centre of the swing when his speed was about eighteen feet a second, for of course a pendulum slows up at either end and its total swing was only two seconds for the eighteen feet of travel. Fun! Lord, it was equal to wing shooting! We soon learnt that one has little time for fine sighting. You could not see the deer at all at the two ends of his swing; you caught a sight of him coming full speed through the bushes, picked him up and led him from a foot to eighteen inches ahead of the brisket, and whaled it to him! It took a long time to realise that you *must* lead a running animal a good deal. Eighteen feet a second is about 12 miles an hour, even that not half the speed of a badly frightened or hit deer, and the time it took the air rifle bullet to reach him was just about the time a high-power bullet would travel 100 yards, calling for an apparent lead, then, of not less than a foot, and better two feet.

At first we held just ahead of the brisket, with the result of haunch shots when they hit at all. The tendency to overshoot was also just as marked as it is with real game running, and the pendulum itself soon accumulated a number of shots in its shank above the deer, showing where many of the shots were going. Gradually we crept up to three out of five hits on

the best strings, and finally I got his number and plunked him four times in four shots, the fifth being a blank. It did not do to hold somewhere ahead of him and let off when he approached the spot within a foot or two. You were *sure* that these were going to register a hit, but they didn't! But when you picked him up coming along full speed, swung along and ahead of him nearly eighteen inches—and were sure that you did it—you heard a satisfactory plunk, and later found the bullet hole in the brisket. My best score was 34; two haunch shots and two briskets (14 and 20), curiously enough the identical score that I made on the Camp Fire deer in 1915, running at 100 yards, the rifle being a .35 Winchester.

Another thing: it took some practice to get your trigger-finger to let off promptly at command from the brain. Time and again your brain would say "Now!" in the rush of aiming and firing at that flying beast, and you could actually see yourself missing, the rifle still swinging ahead but the trigger letting off an infinitesimal fraction too late. Your brain, acting still quicker, would *see* that it was going to be a miss and was already forming an appropriate and forceful *Damn!* which would be out of your system before the rifle bullet would be heard zipping through the underbrush.

You may fondly imagine that you are going to hit that deer this fall, no matter if he goes past you through the woods on the dead gallop. This confidence is fostered by memories of scores that cause you to *know* you can depend upon yourself to make good at standing targets, however dim and ghostly

they may be. But if you want to know just how much you have yet to teach yourself on running targets, make one of these pendulum deer, like the one in this photo, get off 75 yards so that the time element enters into your shooting, and have at him with your hunting rifle! He swings about eight times before he slows down enough to require starting up again. It will not be that easy cinch that you had with those running deer and rabbits in the shooting gallery at 20 yards—not at all, Gertrude! And it's fun; it's the best fun with a rifle that you ever had!

Rifle practice with a big game rifle has or should have one golden rule guiding it—the good old rule, “a miss is as good as a mile.” Many a hunter has spent nights sleepless with chagrin over a mortifying miss which may have been but an inch over the animal's back, may have cut a furrow through the very hair of your deer, in fact—but you would never know it. All those close fours and other well-placed shots which made such a satisfactory group around the bull and showed up so well on the score card—where would you be if they were swept into the discard with the twos and complete misses and only your bull's-eyes counted? That is the trouble with the target: it tends to complacency with close misses and leads away from the accurate holding that gets meat. That, and the visual perfection of its arrangement of black bull's-eye on white paper ground.

Still another fault of the target is its unresponsiveness to a hit. We like to see something happen when our rifle bullet lands. The shattering of the clay at the report of the gun is the satisfying and instant reward

that the trapshooter gets for good holding, but unless you have a telescope you know nothing of your performance on the rifle target until you have shot a string, walked several hundred yards, and then you have, perhaps, a faint glow of satisfaction, but nothing like the thrill you get at even a shiny globule floating on a water jet which you smash in the ten-cent gallery.

I wanted a target that would wigwag a hit to me and calmly ignore my misses, however close—a come-again target, so to speak, that would invite more shooting and register a hit or miss either rapid fire or slow fire, running, standing, prone or kneeling shot, from any angle and seen through the brush in the woods. Something that you could knock over with a rifle shot and that would pick itself up again. The illustration tells how the thing was cobbled up. I set 8 inches by 12 as the size of the target and brown as the color. To make it I used some hard pine $\frac{7}{8}$ in. by 8 in., stock dressed both sides, and an ordinary cast iron spring door hinge bought at any hardware store for 10 cents. The lower part of the target was shaped with the compass saw to something like an inverted spade and the point sharpened so that it could be shoved down into the forest duff at the chosen site, the idea being to take this target out into the hills with you and set it up somewhere on a hillside where you had a chance at it from vantage points on the opposite ridges, the ranges being from 75 to 200 yards. At the top of this spade-shaped piece was screwed the hinge, its upper member taking the target itself, which was simply a piece of the eight-inch stock cut off 12

inches long and reinforced across the back by four tough pieces of maple screwed across the back, for the splitting action of the bullets would send a plain piece of board flying over the landscape at the first shot. Whether to add a face plate of thin iron or steel is a question. Do not fear any upward glance of the bullet, for the inertia of the plate is so great compared to that of the bullet that it has passed clear through it before the plate begins to fold over backward, turning on the hinge. The steel or soft iron plate helps hold the target together, if reinforced with 20-oz. iron tacks all over the surface, and does not add much to your carrying weight.

The action of this target is simply to fold back when a bullet hits it, the hinge returning it to its normal upright position on the edge of the spade-shaped piece which is driven into the earth. Simple but effective in letting you know instantly whether or no you have made a hit, and it is a great target for approximating big game conditions, forest shooting, poor light for your sights, running at speed before firing, dim target and the instant necessity to fire again quickly when you see that you have scored a miss.

CHAPTER VII

TWO RIFLES FOR THE POOR MAN

WHEN I was a boy of twelve I had at last received the paternal permission to relinquish the beloved (and accurate) Chicago air rifle for a "real" powder gun. Within two hours from the removal of the edict against powder guns a stamp and coin collection had been sold and within two days there had arrived by express a certain Belgian muzzle-loading 27-gauge single-barrelled shotgun, advertised by a metropolitan gun house at \$2.75. I think I spent an entire evening just gloating over this marvellous length of gas pipe. She fitted me all over, and lock, stock and barrel, and a certain juvenile heart went out to her in warm and unquestioning admiration. Was she not a "real" gun—a death-dealing, really and truly terror to the game?—Pish!—there was nothing to it!

It was a full two weeks, however, before the exchequer reported funds enough to buy a box of percussion caps, but I had not been idle—far from it. Nothing could be too good for the little queen; the finest horn had to be found, scraped and drilled and bottomed for a powder horn for Her Majesty; the finest squirrel skin in the land had to be fashioned for a shot-pouch, and nothing would do for the percussion caps but a snake's tail, said snake to be hunted

up, bearded in his den, so to speak, and clubbed to a pulp.

At length the wonderful weapon was taken to the woods, where all the delicious details of loading with a palmful out of the horn, ramming home paper wads with the tiny black ramrod, measuring drop by drop the precious lead pellets, and slipping on the copper nipple-cap, filled four-feet-six of boy with ineffable delight. Rabbits, squirrels, highholers and meadow-larks (the last two now happily under the law) were boys' game in those days—and we never went hungry. But the sad fact that 'The Infallible' couldn't hit any of these creatures came home with something of a jolt at the end of the first day's shooting with her. She was a nice gun,—and made a fine noise,—and all that; but compared with the accurate and hard-hitting little old red air rifle, she wasn't one-two as a game-getter. The same victim that was sure eats at the end of a successful stalk with the air rifle would fly away exasperatingly when the "real" gun was turned loose on him. It mattered not that the testimony of my own eyes had told me that 'The Infallible's' barrel was no straighter than my setter's tail—that was no doubt some unexplainable stunt of the gunsmith's but that a "real" powder gun should actually miss what you aimed at was not to be thought of,—seemed incomprehensible, unforgivable. But 'The Infallible'—and a shotgun at that—had to give way before the efficient red air rifle, for a small boy's stomach simply will not tolerate any nonsense about going hungry miles from home.

And then I met up with another youngster who

was weary of life because he owned a .32 calibre Warnant action Flobert which cost so much for practice ammunition that he couldn't hit anything with it. But I had had my practice—lots of it—with the red air rifle. Wherefore when I laid that piece and found you could smash clam shells into such smithering showers that none of them were ever found again; paralyse a crow out of a tall old-field pine, and wallop a hen hawk into the land where all good hen hawks go,—all with a completeness that filled to the brim one's ideals as to what good gun powder should and could do, it was but a short dicker before the Queen and the .32 changed hands. He had found his weapon and I had found mine!

And, for everything this side of the high-power rifle, my preference has been for the .32 ever since. Yet, while there are pages and pages about what a good little weapon the .22 caliber is, and columns and columns of discussion on which rifle is the best .22 and which the best cartridge, I have never seen any one say a good word in print about the .32, which can do all that the .22 can do, and more, oh, so very much more!

But, let me tell you. I am perfectly aware as I write this that the new .250 Hi Power, with its 3,000 feet muzzle velocity, the trajectory of whose bullet can be *seen*, is abroad in the land. But this is not an affair of high power rifles, otherwise the .32-40, .32 special and 7.65 mm. Hi Powers might be dropped into the arena. But in the East, where there are five hunters in the woods after every deer, and where the average shot is not offered at greater range than one

hundred yards, one likes to feel that one's bullet is going to stop somewhere this side of heaven—say, after it has pierced the first six-inch oak in its path—and there is really little logic in going into expensive ammunition and immense power east of the Mississippi, until you get up in Canada after moose. And in low powers the .32 rifle can cover within the compass of one single weapon every cartridge that is needed, from squirrels to deer.

And this statement leads me to the first of the Poor Man's Rifles, the .32-20-115 thirteen-shot repeater. I hear an agonized whoop from the .32-40 and a shrill squeal from the .25-20, both of which cartridges are far ahead of the .32-20 in accuracy,—at three hundred yards. No marksman would *think* of using the .32-20 when he could possibly lay his hands on either of the above cartridges! But, soft! We are not talking of marksmen, nor of rifle ranges with a mule-load of ammunition apiece, nor yet of Schuetzen rifles, with a keg of beer on the side. We are speaking, on the contrary, of a rifle for the cruiser-camper-tramper of the East, whose game may one day be a duck or a wild goose, and the next day a deer; the man who wants but one light rifle in his layout, and is limited to less than two pounds of cartridges for a two weeks' trip. He wants it a repeater because there are always two or more chances to the quick aimer; he wants it lever action, as there is no comparison with it for the bolt when it comes to speed, and, above all, he wants his ammunition pile to look like two small flat boxes of fifty cartridges each, and one tall one of fifty—same dimensions—say

2" x 2" x 3½". And these requirements are met by the .32-20, one box of the high-velocity persuasion, and two boxes of the .32 S. & W. pistol shorts. Here's 150 rounds of please-'em-all ammunition, and if you should also want to make a scientific collection of rare warblers "an' sich," you can add a box of .32-20 shot cartridges which will put 37 No. 10 shot in an 18" circle at 10 yards. The ordinary .32 short will not answer, as its diameter is but .299", while the standard bore of the .32-20 rifles is .311", so it will not even touch the rifling. But the S. & W. .32 short is .313" diameter—two thousandths too large, so that it fits the rifling snugly, and you will have no trouble in nicking a 12-gauge gunwad with it at thirty-five yards, two times out of five, with the other three hugging it close.

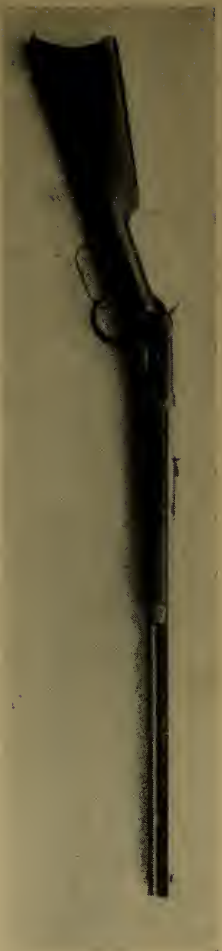
I know that the stubby, 115-grain bullet of the .32-20 has been tabooed along with other shorties as inaccurate by many authorities, but, as a matter of woodland,—not rifle-range, accuracy—when you can plug an 8-inch bull and three close fours with it off-hand with factory sights at 250 yards—your rifle's accurate enough in all conscience!

Getting down to figures, the .32-20 Winchester high-velocity smokeless, suitable for their Model '92 repeater or equivalent Marlin or Stevens rifle, has a muzzle velocity of 1,640 feet a second, strikes a blow of 689 foot-pounds, and penetrates 17 pine boards with full patch bullet. I am not interested in soft wood penetration, but I am glad to have the fact tucked away in my memory that its lead bullet mushrooms out to half an inch diameter after smashing

through four inches of dry maple across the grain. According to the experts the .32-20 has the same trajectory as a tennis ball, but as a matter of fact, it's "not so worse," rising but two inches in the middle of the 100-yard flight and ten inches for the 200-yard (.30-30, $5\frac{3}{4}$ ").

Is this cartridge big enough for deer? No one ever questioned the old black powder .32-40 for this job, yet it only has a striking energy of 747 foot-pounds or 60 more pounds than the .32-20 H. V. Men who don't know the .32-20 would be apt to shake their heads and venture that it lacks bone-smashing power. Let me utter the rank heresy that this bone-smashing stunt is mostly bunk—as far as the .32-20 is concerned. You can fire it at a big bull's rib at its thickest part, up where it hooks into the vertebræ, and it will tear right through it, smashing things to splinters, *and* continue on to penetrate three inches of live oak. This with the soft lead bullet of the reloading tool mould. Take the heaviest bone in the animal, the humerus, up near the pelvic joint—the way the .32-20 walks through it is a crime. I once tried it on a three-inch moose knuckle, the ball joint of the humerus. The little bullet landed fairly on the knob, penetrated straight through, and lodged an inch into an oak against which the bone was placed. You could lay your thumb in the hole on the reverse side of that bone. Kentucky riflemen who used to shoot deer with a pea rifle will tell you that you have power enough and more than enough.

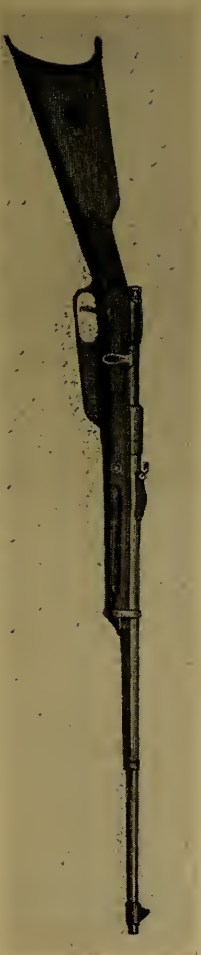
Let's take a trip—in memory's ship—with the .32-20. You are on a three-day tramp and deer hunt, with



THE WINCHESTER MODEL '92, .32-20-115



THE SPRINGFIELD-MAUSER, 7.65 MM.



THE SPRINGFIELD-MAUSER ALTERED TO A SPORTING RIFLE

all you possess in a pack on your back. It is getting late in the day, and, while deer trails are plentiful and cheap, the real goods are not yet invoiced. Here's a partridge sitting on that tree; bad shotgun range, but nuts for a .32 S. & W. short. Grouse or bacon for supper?

If you have a .32-40, it's bacon for yours, as the noise she would make would end the deer hunt then and there, and its chamber is too large for the S. & W. But the little faint *penk!* of the S. & W. cartridge fired from the .32-20 is no great circumstance, so you throw down the lever, catch the shell flipped over your shoulder and pick out the one in the carrier. Out of your pocket comes a .32 short—and into your pocket goes a fat grouse!

Again: You are off for a September canoe trip. Shotgun or rifle? Take the .32 and a handful of shorts. Your shotgun would be a pound heavier, and its shells out of the question. Besides half of your chances will be out of its range. And, just for luck, slip in a half-dozen high-steam cartridges, in case you should stumble on a "varmint." Toward the end of the day's paddle you suddenly drop the motive power and reach for your rifle, for there is a duck swimming in the next bay ahead, and he looks good, though out of range of any honest shotgun. At about 100 yards you drill him with the .32-20—do it just as neatly and with three-quarters of an inch flatter trajectory than the boasted .25-20. And next day, if you run into br'er b'ar—you won't be holding a religious meeting up a tree, as you certainly would if you were the proud owner of the .25-20.

But when you are big game hunting in the Rockies, or after either Eastern or Western moose, or in the barren grounds for caribou, it's all off for the narrow-gauge low-power. You want lots of steam and the flattest kind of trajectories. You'll get most of your shots across cañons with an air-route descent of some two thousand feet, and the range three hundred yards across. But, as Crossman says, it's a case of mining down into your jeans for at least thirty-five pesos for your rifle—and to get a Springfield sporter you will have to have military relatives to boot. But hereby hangs a tale:

Some time ago the War Department made up its mind to have the Army rifle the same length for all arms of the service; whereupon a fine lot of Springfield barrels, the finest in the world, were thrown into the discard as not conforming to the new regulations. Francis Bannerman, the well-known military goods dealer, of 501 Broadway, New York, bought up the available supply of discarded barrels, thinking they might some day come in handy. Having on hand about two million 7.65 mm. (30 cal.) Mauser cartridges, he bought up a lot of German Mauser rifle actions and fitted them to his Springfield barrels. A little juggling of the stock and chamber was then all that was needed to turn this weapon into a "sporter" equal to any of the hi-power bolt-actions afloat.*

The 7.65 mm. cartridge is in appearance very like the .30 cal. U. S. Govt. rimless 1906, and shoots the

* NOTE.—All these Springfield-Mausers have been bought since the European War.

.303 British 215 grain bullet with a load of 23 grains of smokeless. It has a neat muzzle velocity of 2,000 feet a second, and it swats like the hammer of Pabst, with an energy of 1,908 foot pounds—within 44 foot pounds of that famous Thor person's performance.

When I heard that Bannerman was selling out this lot of Springfield-Mausers for \$11.85, I had him send me one, as it looked like a good thing for the man who can't afford a hi-power in the regular run of trade. When one has to choose between new shoes for the kids or a new rifle for the old man; or the madam wants her winter suit—well, you know how it is, we men have got to hang together, or there wouldn't be a gun purchased in the country! So I proceeded to investigate the bargain in Springfield Sporters before they all got away. Gun came to hand in a day or so. A peach of a barrel, with twelve dollars' worth of adjustable rear sight on it, 2,000 yards' range, a little milled wheel to adjust wind-gauge, and a convertible peep or open U;—peep is on a leaf of the U-bar, and comes up with a push of your thumb. Army front sight. Mauser action by V. C. Schilling, of Suhl, that hot-bed of German gunmakers. A little button on the action permits you to take out the entire bolt and clean it, or use it as a weapon of offense, or as the buck in a game of draw, if you prefer. Safety is "off" to the right, and "on" to the left, so that either way it lies low, and you can aim the piece for silent practice. Butt is heavy and clumsy, musket fashion, but a new rifle heel plate and a spoke-shave are now doing wonders for it. Butt has slot in it for strap and the forward barrel-clamp has a similar slot,

so one is well fixed for a rifle sling—a handy thing in a mountain country. The cartridges come in the military clip, and you transfer them to a light pressed steel open bottom magazine clip à la Mannlicher. To load the rifle you simply push the clip down until it catches. I believe that Lieutenant Whelen holds the speed record with the Army bolt gun, with five aimed shots in $5\frac{1}{2}$ seconds, while the lever record is 2 4-5 seconds (Haines).

It would, however, be a good stunt if these Mannlicher military sporters could have some sort of a light spring catch which would hold the clip when the last shot is fired. As it is, it drops merrily on the ground as you eject the last shell—which would be provocative of assorted profanity if the “ground” happened to be some wet river, or a crevice in the rocks, or that no-man’s land under a wind-fall.

As regards penetration, the records credit this cartridge with 56-inch pine boards with full patch bullet. Personally I noted that it showed no hesitation about ambling through eighteen inches of oak across the grain. At these high velocities it is questionable about how much mushrooming effect the bullet should permit. If it mushrooms too much the bullet will not smash bone, as has often been the case in moose shooting with small bores. Big game shooting with the Springfield and the new Spitzer bullet show terrible wounding qualities for the hard bullet encountering bone, as its smashing power then becomes enormous. Delivering the whole 1900-ft. pounds of energy upon a devoted beast is like dropping a ton of bricks on it, concentrated at the bullet

point. (And the .32-20 with the 689 foot-pounds is, by the same token, equivalent to dropping from a foot above him more than a quarter of a ton of scrap-iron on a deer's vitals.)

The best way to test bone-smashing qualities of a cartridge is to smash bone with it, so I got me the largest bone knuckle I could find; four measured inches through. The full patch Mauser bullet was turned loose on this cute little toothpick, with the result of pulverizing it into five pieces and assorted sizes of fine splinters, *after* which the bullet pierced a twelve-inch black gum tree, and is going yet, probably.

As regards accuracy I did not find that any tests I could devise amounted to more than corroboration of the well-known Springfield barrel grouping of five shots in a four-inch circle at 200 yards from muzzle rest. I was pleased to note, however, that in field work with her out in the hilly pine barrens, a few miles back of the Coast, she was very accurate and satisfactory at all sorts of ranges and marks. As a nail-driver I also tried her on an oak billet offhand, shooting first a hole in it and then aiming at the hole with sights set at 300 yards, distance being about 20. The result was a neat group just above the bullet hole that you could completely cover with a ten cent piece. Kick was about half that of a 20-bore shotgun. You can reload the Mauser cartridges or get the identical cartridges new, American made. Write for the 7.65 Mauser rimless to any of the big cartridge companies. For a bullet use the Ideal No. 10 reloading tool, casting the 311299 bullet which fits the .303

British and the 7.65 mm. Mauser on 23 grains of "Lightning" powder. You will need gas-check cup bullet bases to prevent fusion and gas-cutting, as the powder gases of the hi-veloxes walk right around lead grooves and make curious alloys of your rifle lands. Gas check cups list at a dollar a thousand, so there is no cause for your pocketbook to take fright. Mauser shells with the full patch bullet can be had from Bannerman for \$2.00 a thousand, but if you are a mushroomer you can buy them soft nose from our own companies for \$3.85 a hundred, or else you will want to load your own shells. Ordinary lead will not do, being too soft, but you can buy hi-power bullet-metal alloys from any of the reloading companies, and, with a can of smokeless, you can have all the cheap shooting you want. Personally I reload my .32-20s with ordinary lead bullets, using a Dupont smokeless which has the same bulk measure as black.

These two Poor Man's rifles weigh nearly the same, the .32-20 being about $6\frac{3}{4}$ pounds, and the Springfield-Mauser $7\frac{1}{2}$ pounds, so that practice with the one is all to the good when you change over to the other. Reloading is not only cheaper, but also—how one *does* love to fuss with anything that can sling a bullet!

A final word, as to putting some "class" into the appearance of the Springfield-Mauser. As she comes to hand she is almost a musket with a rather clumsy butt, excellent for grounding "harmps" on brick pavements, but broader than the rear-end of a fat bear. She also has too much wood for'd to please the eye. The front fore-end joint can come off as far back as

the catch for the second barrel strap. The front barrel strap takes off by unpinning the front sight and unscrewing a small woodscrew. The old Springfield barrel was double shelled, the outer part that you see being a non-conducting heat jacket. Wherefore, when you take off the forend cap, you must replace it with one which your gunsmith will make and blue for you, as it is at this point that the outer and inner barrels are joined together by the cap. Thus altered, you get the clean Sporter barrel with short fore-end. Then get you a case-hardened Swiss rifle butt plate, costing \$2.80 (the Winchester rifle butt-plate is a good one), unscrew the musket butt-plate and get busy with a plane and spoke shave. You must also get off a good deal of wood along the comb, thereby saving a bruised lip. Finish off by checking the tang with a V-groove carving chisel, smooth down with fine sand-paper, polish and oil. She will look as in the illustration, and you will then own a rifle, handsome in appearance, splendidly sighted, and having the finest rifle barrel in the world. And a \$25.00 bill will cover your entire two-rifle arsenal from squirrels to deer and from deer to dinosaurs.

CHAPTER VIII

THE .22 RIFLE

A SUBSCRIBER, deficient in the saving sense of humor, once wrote in to the Editor of *Field and Stream* asking for a definition of the term "Cat Rifle"—couldn't find it in his dictionary. By that term he of course meant the useful and ubiquitous least-calibre rifle, the adorable .22. For all the world loves the .22. It is the small boy's idol, the fisherman's delight, the big-game hunter's fowl-in-pot and the marksman's training school. You can shoot it anywhere, in unlimited quantities, take it along no matter how light the going, and acquire a warm affection for the little devil that will accrue with a growing respect for its unvarying trueness to the mark and with memories of phenomenal shots that you hardly believed her capable of.

Of course, if it was left to the manufacturers to select the .22s to be described, they would all want to show their repeaters, since gunmakers take even more pride in the mechanics of their weapons than in their practical utility afield, but I here describe only two representative repeaters, the Remington and Marlin, latest models. The new Savage 10-shot .22 is also touched upon because it is the first of the bolt-action .22 repeaters, and, with about a pound taken off the

weight of barrel and stock, will have a future before it as a member of the Ancient Order of Cat Rifles.

The first things that the fisherman and hunter demands from his .22, aside from a reasonable accuracy, are lightness and simplicity. Next, he wants something that he can clean easily and see that it *is* clean; an action that can get moderately dirty without jamming or clogging; something that he can drop overboard or leave out in a shower or in the bottom of a wet canoe and yet take apart without trouble to get at and wipe down each piece so that later it will not rust and annoy.

The cat rifles are all as accurate as you can hold. It is more a matter of knowing the zero of your particular rifle, for the sights are large and coarse and your first experiments had better be with a sand-bag rest until you know your rifle's zero and know how to lay your sights to it. For instance, after getting fairly accurate at the 25-yard target, take some long rifle cartridges and try your luck at the 200-yard. My word for it, you will find none on the target out of your first string, and may have to pick up your zero at 100 yards and work back from it to the 200-yard target position. The long rifle cartridge has a trajectory of *only* 21 inches at 200 yards, so that the front sight has to stand up like a factory chimney to give the needful elevation. As I said before, the quickest way to learn how to hold your .22 for long ranges is to work back by 50-yard steps from some familiar range, such as the 25 or 50-yard distance.

None of the cat rifles have, to my mind, the ideal open-sight combination, viz., a rear U notch and a

square-section frontleaf sight, such as are found on the army Springfield. The optics of open rifle sights seem to me to figure out as follows: Since the gaze of either one or both eyes is focused on the bull's-eye, the combination of both rifle sights makes a mechanical figure, more or less blurred, which you centre under the bull. Now, this mechanical figure (bar and U, for instance) must also be in correct alignment, and the combination of shapes for front and rear sight which shows easiest any deviation from true alignment makes the best set of open sights. In the bar and U there is plenty of light showing around the bar, so that the eye notices at once if the bar is not in the centre of the U, even when not in focus, and your hands can correct the lay of the rifle while your eye is still focused on the bull.

Winchester and Remington use the silver bead front and U rear combination of cat rifle sights, but optically it has the disadvantage that the front and rear shapes are too similar. The bead fills the U notch on fine sights and bead and notch blur on half-sight, both because of similarity of shape. The Marlin and Savage V rear notch and bead front sight has the same objection, particularly on fine sights. The Stevens, with a square section bar front sight and rear V notch, is easier to shoot. With a rear U notch it would be as easy as the army Springfield, where the square front sight stands out sharp and clear, even with the eye focused on the bull, and the sight is exactly the width of an 8-inch bull at 250 yards, whereas the ordinary bead sight shows considerably larger. Riflemen, in general, are coming to realise



.22 CAL. RIFLES

Top to bottom: Winchester, Savage bolt, Stevens, Remington, Marlin, Savage slide action.



"CAT RIFLES"

Top to bottom: Marlin, Savage, Stevens, Winchester, Quackenbush, Remington.

that the army open sights are the easiest to shoot with. Why not put the bar-and-U combination on our sporting rifles instead of the bead-and-U, since it makes a stronger and cheaper sight?

There is a good deal of tendency to overrate the capacity of the .22 short, long and long rifle cartridges. Even the long rifle has but 45 grains of lead, shoved along by 10 grains of powder, which gives it a striking energy at the muzzle of but 122 foot pounds, and this dwindles to 83 at one hundred yards' distance. Compared to the ordinary .32-20 with 689 foot pounds, the cat rifle breed certainly lacks the punch of the .32 calibre tribe.

We hear of wonderful scores with the long rifle .22. As a matter of fact, if you hold zero on the bull at 200 yards, it will land approximately 21 inches below it, and at 100 yards will drop 5.82 inches. For this reason, knowing your zero, you must exercise almost as much judgment in drawing your sights at long ranges as would an archer shooting rovers. And, with a cross wind, the drift is quite as great as the drop, so that the field shooting at ranges much over 100 yards with the .22 is almost guesswork, until you get to know your own particular rifle in all winds and weathers and acquire somewhat of the automatic judgment of the wing shot.

But at 25, 35 and 50 yards, the .22 is entirely in its own sphere. Almost any good holder can wop out "possible" after "possible" at 25 yards with any of the cat rifles, and 35 and 50 yards simply require a little more judgment and experience in drawing your sights and allowing for drift. At 35 yards the drop

from point-blank is about $1\frac{1}{2}$ inches for the .22 short, and the drift in a brisk breeze about $\frac{1}{2}$ -inch. I give herewith sketches showing the zeros of the six cat rifles at 30 yards.

As to loading, the following manœuvres become incumbent upon the would-be cat tickler: Winchester, bolt; Rotate bolt, insert cartridge, return bolt and lock it. The act of locking does not cock the firing pin so that up to that moment the piece is safe. The extractor is straight pull, drawing a .22 short case entirely from the chamber and the .22 long nearly so. It is simple and strong and will not stick or freeze fast, and you can always put more steam on the bolt handle if the cartridge gets obstinate.

Remington Repeater: Loads by pulling out brass magazine tube and dropping in the cartridges until full, when the tube is shoved home and locked. Operating slider, loads, cocks and extracts, though the first cartridge can be put in by simply pressing the magazine tube. The extractor is a straight pull and steel hook, throwing out to the side. To empty the magazine, pull out tube, when the remaining cartridges will run out at the slot. They will not click or rattle, however, with the tube pushed in and locked. Neither trigger nor hammer will operate unless the slider is at full forward position, when it locks the recoil-withstanding parts and is safe.

Marlin: Magazine loads by drawing out tube and dropping in the beans. Has safety mechanism, which locks all firing parts until the slider is full forward. To unload magazine, simply pull out tube and invert

rifle, when all cartridges will drop out. Extractor is a steel hook, throwing the case out sidewise.

Stevens: Simply break gun and pick out cartridge case, which is pulled out $\frac{1}{8}$ -inch by the extractor. Under-lever cinches the barrel tight against breech block, taking the strain off the joint. For a small boy this little rifle is a favourite weapon because of its light weight.

Savage: Magazine loads by pulling out a rod in the butt. Used .22 shorts only, 10 cartridges. Long rifle cartridges will not make the turn in the loading tube junction with the magazine tube. Having dropped in the beans, slide back the rod and secure with a half-turn, bringing the catch over the loading tube. A carrier in the stock feeds the cartridges one by one to the barrel as the bolt is slid back. Bolt has a bent handle and turning it down cocks the firing pin. Extractor is a top hook on bolt, drawing the cases and tossing them out over the breech. It is a simple mechanism, not likely to get out of order. Cartridges are kept from getting loose by spring feed in loading tube.

The weight and dimensions of these rifles are as follows: Winchester .22 bolt: Weight, $4\frac{1}{2}$ pounds (a lighter model weighs $3\frac{1}{2}$ pounds); length over all, 3 feet 1 inch; length, taken down, 24 inches. Remington .22 repeater: Weight, $4\frac{1}{2}$ pounds; length, 3 feet $2\frac{1}{4}$ inches; length, taken down, $25\frac{1}{2}$ inches. Marlin .22 repeater: Weight, 4 pounds; length, 3 feet $3\frac{3}{4}$ inches; length, taken down, 26 inches. Stevens-Maynard: Weight, $2\frac{1}{2}$ pounds; length, 2 feet $8\frac{3}{4}$ inches; does not take down. Savage repeater:

Weight, 4 pounds; length, 2 feet 11½ inches; length, taken down, 23½ inches.

You will note from the above that any kind of repeater will stand you about 4 pounds weight, and take two feet length of package, so that any of them will go in an ordinary duffle bag with ease. The weight is, however, excessive for the trout fisherman out on a pack trip where there is lots of manœuvring along rocky stream beds, and for him either the 2½-pound Stevens-Maynard or the 3½-pound Winchester bolt is the weapon. As a second gun for the big-game man, I should recommend the repeaters. Most of their weight is in the barrel, where it gives the most aid in steadiness of holding, and the rapidity of the action is almost inconceivable. In the magazine is a clean and comfortable way of carrying fifteen or sixteen rounds of ammunition, and when you tear loose on duck, grouse or small furred game you want to be able to keep plugging him again and again until he is down to stay. And, for target practice or for glass-ball-artist training, the repeater is the only weapon.

To clean: Winchester: Take down; press on sear and extractor and take out bolt, giving you a clear view of the rifling. Taking off barrel exposes all trigger mechanism. To take apart bolt, drive out the guide pin of the firing pin, which will free the firing pin and allow you to clean everything but the spring, which latter can also be taken out by driving out the firing pin head pin. A short and simple tale, and the only tool needed is a small nail.

Remington: Unscrew pin on side of frame (no

tool needed) and pull stock from barrel. With the stock comes all the hammer mechanism, which is thus exposed for cleaning. Bolt and carrier remain in the frame. To get out bolt, press catch pin on slider connection, after which the rifling can be seen and bolt cleaned.

Marlin: Take down by unscrewing a pin on side of frame, after which the receiver will come in two halves, exposing all the mechanism, including the hammer, for cleaning. To get out bolt, lift the slider connection off its pin, press firing pin releasing the bolt, when the rifling becomes visible.

Savage: Unscrew knurled nut under fore-end and take down, exposing trigger mechanism and carrier. Press trigger releasing bolt and giving a clear view of the rifling.

Stevens: Tip-up action, so that the rifling is always visible upon breaking. Mechanism is easily gotten at by unscrewing lever pins. And, while on the subject, let me point out that the rounded upper corner of your camp axe is an excellent screw-driver, one that will unscrew all sizes, big and little. I have completely taken apart and cleaned my model '92, solid-frame Winchester, using the upper corner of my axe only for the screw-driver.

With my own weapons, just as sent from the factory, the trigger pulls stack up as follows: Winchester bolt single-shot, 6 pounds; Remington repeater, 7 pounds; Marlin repeater, 6 pounds; Stevens-Maynard single-shot, 3 pounds; Savage bolt repeater, 3 pounds. Four pounds is standard for Springfields, Mausers and other typical army rifles. Anything over this

makes hard shooting. I give here the hammer pulls because the manufacturers do not seem to realise that boys are the principal users of the midget rifles, and their small fingers are not strong enough to cock the firing pins of our bolt .22s without a great deal of unnecessary effort and a risk of the nut slipping from their grasp and discharging the piece wherever it happens to be pointed. While the Savage cocks on closing bolt, both it and the Winchester pins require 12 pounds pull to cock them, and a boy of ten to twelve years will writhe and twist in his efforts to get the pin back to the sear. With pivoted hammers the leverage of the hand comes into play, so that even a small boy can cock the Marlin and Stevens easily with a hammer pull of 7 and 8 pounds, respectively, firing pin.

The drops for the above cat rifles line up thusly: Winchester, $3\frac{1}{2}$ inches ($3\frac{1}{8}$ inches in light model); Remington, 3 inches; Marlin, 3 inches; Stevens, $2\frac{7}{8}$ inches; Savage, $3\frac{1}{8}$ inches. Distance trigger to butt: Winchester, 13 inches; Remington, 13 inches; Marlin, $13\frac{1}{2}$ inches; Stevens, $13\frac{1}{8}$ inches; Savage, $12\frac{3}{4}$ inches. The above measurements will have a good deal to do with the selection of a rifle to fit your boy, for if the stock is too long he will have to lean back to bring the centre of the gravity of the rifle in far enough, and too much drop in that position will make it difficult for him to catch his sights. Boys of twelve to fourteen usually adapt themselves to almost any reasonable dimensions. To tell off-hand if the rifle fits your boy, let him lay the piece with both eyes shut. If the sights are found in reasonable alignment

on opening his eyes, the drop is right. For correct stock length, the butt should swing easily over his biceps when the rifle is grasped naturally by the tang and swung vertically, muzzle up.

A boy should learn his gun manners very early. I do not advocate his being allowed afield with a .22, either alone or in company with an older sportsman, under twelve years of age, for he is sure to stumble and fire his rifle off into the back of your neck or take out a piece of your ear if any more irresponsible than the average twelve-year-old. But for target practice, under the tutelage of an elder, nine years of age is none too soon to begin to learn to respect the .22 and all its works.

But to really learn to shoot and hunt, a boy should go afield for himself between nine and twelve years, and the proper weapon for him is an air rifle. Twenty years ago we had just the rifle, a little red affair, accurate as any smooth bore can be, a nail driver at 10 yards and a sparrow hitter at 25. It shot the BB bullet at a few cents per pound, and a boy could practise or shoot afield all day and all the days without his pocketbook feeling it. It had a penetration of 3/16 inch of white pine, and would kill a tough old flicker at 20 yards or a squirrel at 10.

Nowadays we have no such rifle. The Red Rifle was driven out of the field by a lot of gaudy, nickel-plated, tin imitations of "real" guns that never shoot twice in the same spot, have fixed sights and the unbelievable trigger pull of 21 pounds. Naturally our boys had no chance to become marksmen with such toys, nor did those who were raised in cities care much,

as they used the tin air rifle principally to play Indian with. But the country boy, who begins his real shooting early, mourns the departed Red Rifle. Its best substitute is the \$3.00 pump action repeating air rifle, 50-shot, by the Daisy people, a hard hitting and accurate air rifle. There remain the high-priced Quackenbush air rifles. The Quackenbush illustrated weighs $3\frac{1}{2}$ pounds, is 2 feet 11 inches long, does not take down, and has a drop of $3\frac{3}{4}$ inches and length of pull of $13\frac{7}{8}$ inches. It is accurate and effective up to about 25 yards, shooting .21 felt slugs at 10 cents a box of 100 (expensive ammunition for a juvenile), with a penetration of about $\frac{1}{4}$ inch of white pine. Using steel darts which can be pulled out of a board target and used over again *ad lib* is the cheapest practice scheme. The sights are a taper pin front and V rear notch, and the trigger pull is adjustable to anything from 2 pounds up, though best set at $3\frac{1}{2}$ pounds.

CHAPTER IX

THE U. S. MILITARY RIFLE

THE Springfield, officially known as the United States Rifle, Calibre .30, Model 1903, is the Service arm of our Army, Navy and Marine Corps. It has displaced the Krag, formerly used in the Army, and the Lee .256, formerly the Navy standard. It is acknowledged to be the best military rifle in the world, for it far exceeds all others in utility as a soldier's weapon, and in killing power its '06 exceeds all the earlier cartridges. The old Krag was a rim fire cartridge, the popular big game .30-40, with a rimmed shell or case, and its magazine fed sideways, making a rather wide and clumsy receiver and stock therefor. The Krag or "Army," as it is called in the trajectory tables, has a 220-grain bullet, of the usual blunt-nosed big-game shape, propelled at 1997 ft. muzzle velocity, and it develops an energy of 1949 ft. lbs. Its midrange trajectory height for the 200-yard range is 5.48 inches. The Lee 6 mm. or .256 cal. Navy was a better rifle as regards muzzle velocity, having 2562 ft. secs. and it was intended to kill at long ranges with considerable penetration of light warship armor, such as the plating of lookout tops, etc., but its muzzle energy was but 1632 ft. lbs. owing to the light 112-grain bullet. Both weapons went

into the discard in due course of time, though both were the standard during the Spanish War. With the 1903 Springfield came the Govt. 1903 cartridge to match, a 220-grain bullet driven at 2204 ft. secs. and developing 2374 ft. lbs. muzzle energy. This was unsatisfactory because it still had the fault of a high trajectory, 4.52 midrange at 200 yards, and 11.40 in. midrange at 300, so the Army went at it again, adding more powder to the charge and lightening the bullet to 150 grains, besides making the all-important change to the spitzer point which reduced the losses due to air resistance. This gave us the famous Govt. '06 cartridge, with the enormous muzzle velocity of 2700 ft. secs., and, since the energy of the bullet increases as the square of the velocity, the muzzle energy of 2426 ft. lbs. It also lightened the cartridge so that a bandolier of sixty rounds of ball cartridge weighs but 3.88 lbs. It made an ideal military cartridge, for, with the high velocity, the trajectory height dropped to 2.95 in midrange at 200 yards and 7.50 midrange at 300.

Big game hunters were quick to realise the value of this cartridge. It was found that the splitting effect of the spitzer point, backed by the high velocity, gave great shocking power even on tough African big game; that, while the earlier military cartridges were mere puncturers, like many of those now used in the present European War, the Springfield was a killer. The 150-grain bullet was, however, a trifle light for such game as moose, elk and grizzly, and so two more Govt. '06 cartridges were gotten out by the ammunition companies for use in regular big game rifles.

These had 180 and 190-grain bullets, and the former developed 2517 ft. lbs. muzzle energy, or almost as much as the .35 and .405 Winchesters. At the same time the trajectory only rose to 3.29 and 8.22 inches midrange height over 200 and 300 yards respectively, so the chances of over-shooting were reduced to a minimum. The cartridge then became very popular, and most modern big game rifles are made to handle it.

But, for military purposes, we have to deal with the bolt action repeating rifle as the best suited to battle conditions, and, as the Springfield is the best of all the type, we will describe it in detail. In a bolt rifle you want something fool proof, easily cleaned, and not capable of too rapid fire. The game is Man, easily killed if hit with but a single shot, and not trying to get away at express speed, nor inclined to struggle on if once hit. With a major big game animal you want your shots quick and plenty, so as to knock him down and keep him down. With Man collected into armies you want fire distribution and fire control in platoon units; you must have a light cartridge that can be carried in quantities to the battle field and on the march without fatigue, and you must have a rifle that will fire them accurately without jamming or clogging in the excitement of charge and hand-to-hand combat, and one that will not easily get out of order. As to weight, the rifle must weigh enough to take up the free recoil of the cartridge without distress and yet not be too heavy to carry on march, and this is done at about 9 lbs. for our service weapon, a trifle heavy for a big game ideal.

The Springfield meets all these conditions admir-

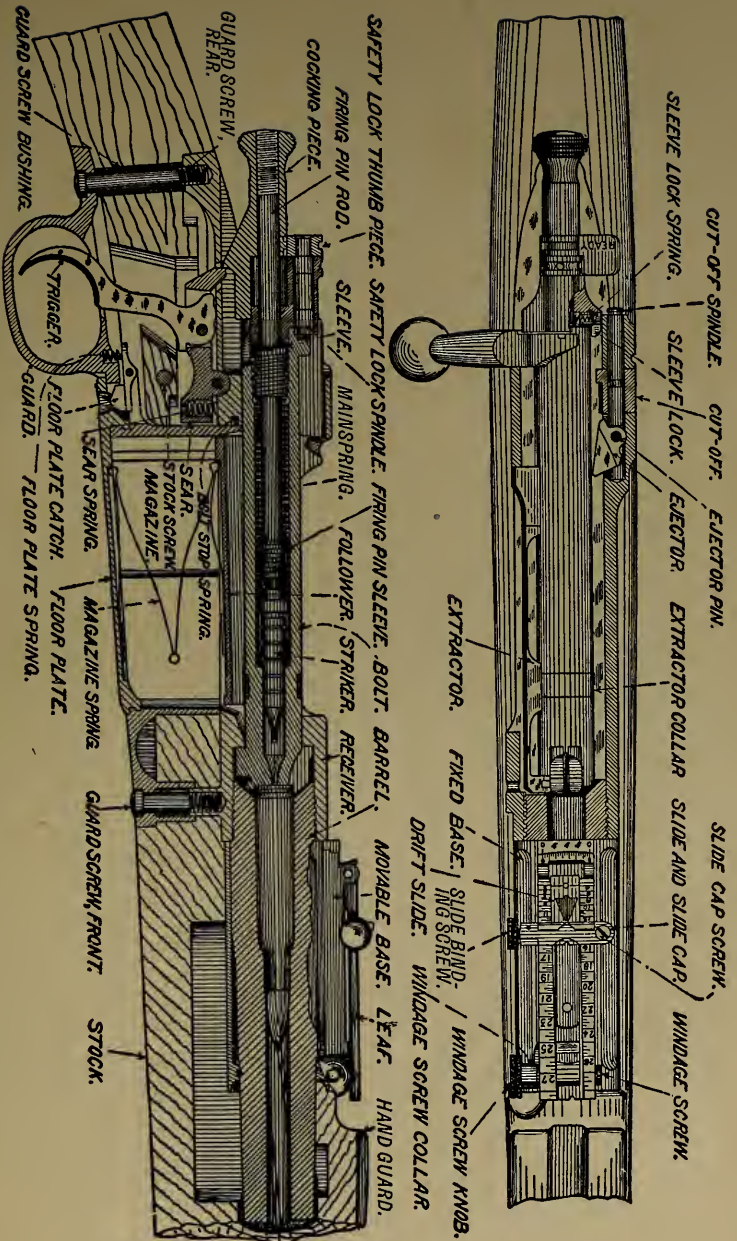
ably. You have a 24-inch barrel, perfectly rifled with four grooves, .004 inch deep, one turn in ten inches. This barrel is secured by a threaded tenon into a steel receiver which is channelled to take the firing bolt, provided with two cammed locking recesses in the barrel breech, a safety shoulder against which a third locking lug on the bolt takes its bearing, and on which also are mounted the safety and magazine cut-off devices, and in the bottom of this receiver is a long slot, called the magazine well, up through which the cartridges are fed. For rapidity of loading, military cartridges are furnished in brass clips of five each, two clips to each pocket of the ammunition bandolier carried by the soldier over his shoulder. To load, the bolt is drawn back and a clip pressed down on the follower plate of the magazine by the right thumb. The cartridges slide out of the clip and arrange themselves in a double row in the magazine, three cartridges on the right and two on the left, instead of one below the other as in box magazine big game rifles. Closing the bolt casts away the clip, and rotating it by the knob handle cocks the firing pin, when drawing it back permits the first of the cartridges in the magazine to come up under the extractor hook on the bolt. It is then shoved forward into the chamber by closing the bolt, and rotating its knob downwards brings the sear notch into operative position with respect to sear and trigger. Pulling the latter draws down the sear notch, releasing the firing pin and striker which is attached to it, and the latter is driven forward by the coiled mainspring on the firing pin until it projects out of the bolt and

drives in the primer in the cartridge. Rotating and drawing back the bolt not only first starts out the empty shell by cam action from the chamber, but takes it back and tosses it out of the receiver, leaving the space free for the next cartridge, which is promptly shoved up out of the magazine, past the guiding ramp and up under the extractor hook. Shoving the bolt forward and closing the action by rotating it reloads the weapon, and so on, until the five cartridges are gone, when it can be very quickly reloaded by pushing in another clip. The record speed with the bolt action, so far as I am aware, is five aimed shots in $5\frac{1}{2}$ seconds; that of the lever, five aimed shots in $2\frac{4}{5}$ seconds. One would say that the modern box magazine lever rifles have all the advantages of continuous fire with clip cartridges plus the double speed of rapid fire, if necessary, but in military affairs it has been found needful to limit the speed of fire to 10 shots a minute for 200 to 400 yards firing, 7.50 for 500 to 700 yards, and 5 shots, 800 to 1,000, all of which are well within the capacity of the bolt action.

A diagram of the Springfield action, in position to fire, is given herewith. Note the position of the striker, drawn back in the bolt; the bolt lugs, locked in their recesses in the receiver; the short safety lug, backed solidly against the safety shoulder on the receiver frame; the sear notch of the firing pin engaging the sear; and, note also that the trigger is pinned to the sear, with its upper bearing surface touching the solid metal of the receiver bottom. It is obvious that if you pull the trigger this bearing will *push*

against the solid frame of the receiver, and there will be no other thing for the sear to do but swing downwards about its own pin, thus releasing the sear notch. This will give a smooth, easy trigger action, but one with a *creep*, which is present in nearly all military rifles, that is, the sear has to move an appreciable distance before releasing the notch instead of being pulled directly out of the notch as with most hammer-and-trigger mechanisms. This is a point of great moment with big game hunters, and it has led to the essential difference between big game shooting training and military shooting training. For with the hunter's trigger release instantaneous, the training must be in prompt trigger release, in exact co-ordination with the eye aiming through the sights, the instant the latter swing on the mark, while in military training the sights are to be *held* on the mark while the trigger is squeezed off, and the trigger mechanism is designed to meet this style of shooting.

It is all set forth at length in the "Small Arms Firing Manual" issued by the War Department, a book of some 250 pages, written partly by my friend, Lieut. (now Captain) Townsend Whelen, U. S. A. To make good shots out of the greatest number of average recruits with the least expenditure of time and ammunition is the aim of this manual. The course begins with aiming and position drills with the rifle empty. These train the recruit in the proper technique of sighting and holding in the various positions of standing, kneeling, prone and sitting, in each of which he goes through a long course of sighting and squeezing off the trigger properly under competent



TOP VIEW AND VERTICAL SECTION OF THE ACTION OF THE ARMY SPRINGFIELD '03, .30 CAL.

instructors, so that before a single cartridge has been expended the novice has no faults to unlearn, and the holding and trigger muscles are properly hardened and brought into co-ordination with the eye. For a beginner in big game shooting with his new rifle, such practice is also invaluable, in fact, I never omit holding drills all through the closed season; a few minutes nightly keeps the muscles in trim. One gets so used to "calling the shot," that is, noting just where the sights were when the hammer came down, that the bullet hole in corroboration is hardly necessary.

The Army course follows with gallery practice at 50 and 75 yards, kneeling, standing, prone and sitting. The loads used are generally the armory charges of about 15 grains of powder, reloaded in used cases, and are entirely accurate at indoor armory ranges. This is followed with windage and elevation drills with empty rifle, the corrections for the service rifle being 3 points on the gauge windage to move the point of striking one foot at 100 yards, 1.5 points at 200, 1 point at 300, etc. Then, for elevation the correction necessary to raise the point of striking one foot is 485 yards at the hundred yard range, 185 yards at 200, 105 at 300, 70 at 400, 48 at 500, etc. The rear sight of the Springfield is a "leaf" or ladder with graduations from 100 to 2800 yards and it has both U and peep sight holes in a movable bar on the ladder. When the leaf is flat a third U is exposed, on the edge of the sliding bar, which is now lying flat on the sight base. This third U is called the "battle" sight, because the trajectory of the Springfield is so flat that, at all skirmish and open battle ranges

around 200 to 500 yards, any enemy target is within the danger zone of the bullet's flight. The front sight is fixed and immovable, being pinned to a collar swaged to the barrel. The front leaf itself can be taken out by driving out the pin in case of breakage, and, on the march, is protected by a spring steel sight guard. The rear edge of this front sight is a vertical black face, making an ideal combination with the black rear U when held on a white target paper with the bull's-eye just centred above the top of the sight and a thin white line showing between it and the bottom of the bull; but, for big game, I find a good modification to consist in filing a 45 degree flat across the sharp nose of the sight top, this bright "mirror," as it were, reflecting the skylight into the shooter's eyes. This gives a bright square bead which can be seen against dark and grey objects in all lights, and is visible earlier in the morning and later at night than any other sight. And, unlike beads, it does not shoot away from the light.

The recruit is then introduced to the open range and to full service charges. If his scores show he has not profited by his holding and aiming practice, back he goes to that kind of drill again. But, as a rule, he shows good proficiency, and the gallery practice has helped some, though open air conditions are quite different. He begins at the 200-yard range, and shoots in all four positions until he qualifies in the lowest grade in "known distance practice," as shooting at known ranges is called. All officers and men must qualify on this course, of all branches of the service. The methods of aiming and firing are uni-

form; first, a comfortable stance is taken in the prescribed position (which we give in detail later), varied slightly to suit the individual peculiarities of the soldier; next, a full breath or several of them are taken to quiet down the heart action of the body and reduce the later respiration; then a full breath, which is partly expelled, and the rifle is raised into the mark. After a short hold, when the sight should come to rest under or near the bull, the squeezing process begins, and, when the sear is about to release, the sights are steadied as much as possible immediately under the bull's-eye, and the firing pin is "wished off."

Next come estimating distances, for objects seem nearer when seen in a bright light; in contrasting colours; when looking over uniform colours of terrain as water, snow, wheat, etc.; and when looking from a height downward; and they seem more distant when looking over a depression in the ground; in a fog or poor light; when only a part of the object can be seen; and when looking upward at the object. The soldier is taught to estimate by units of a hundred yards; by estimating half distances and doubling them; and by comparison with known parallel distances, such as along roads, etc. Also by trial volleys and by noting the speed of travel of sound, as the report of an enemy's cannon, measured from the flash. All this leads to further qualification at long ranges, in addition to which the factors of wind, temperature and mirage, which do not enter into 200 to 500 yard work, are studied. The wind gauge is graduated in points which will move the bullet about 4 inches per point at 100 yards, 8 in. at 200, 24 at 600, etc. The rule

is Range times Velocity divided by 10 equals quarter-points to be moved:—800 yds. x 5-mile wind divided by 10 gives 4 quarter-points, or one point to move the wind gauge. The direction of the wind is reckoned in hours of the clock; III and IX o'clock being across your face, agreeing with the formula; and I, V, VII and XI being about 45 degrees across your face, with a windage of one-half the results given by the formula.

A rise in temperature causes the bullet to strike high; a decrease vice versa, due to change of density of the air and consequent alteration of the air resistance and trajectory of bullet. Mirage is due to heat waves, easily seen through the rifle telescope in bright sunlight. They show the direction and speed of the wind, and the waves go straight up or "boil" in a calm. When there is a wind blowing do not fire in a "boil," for there is certain to be a drift and you will land off the bull.

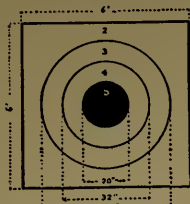
Army rapid fire, equivalent to the hunter's running shooting, is done by a rapid squeeze of the trigger, as no quicker release can be obtained due to the construction of the sear. The rifle is not taken down between shots, but held to shoulder with the left hand while the right manipulates the bolt. The idea inculcated is to catch the aim quickly and hold it while squeezing as rapidly as possible. Obviously no such perfection can be attained as with the hunting rifle, but very good rapid fire scores are made both in the Army and Guard. Ten seconds per shot is "rapid fire" in military usage, while in hunting two seconds is ample, and three seldom used. During the last

UNITED STATES ARMY TARGETS USED BY RIFLE CLUBS AND THE ORGANIZED MILITIA.

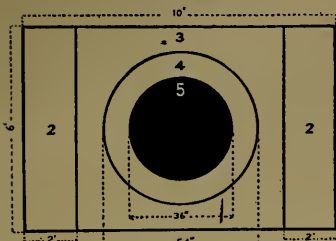
TARGET A



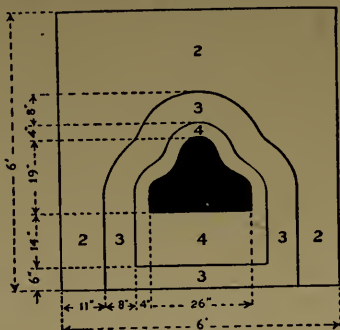
TARGET B



TARGET C



TARGET D

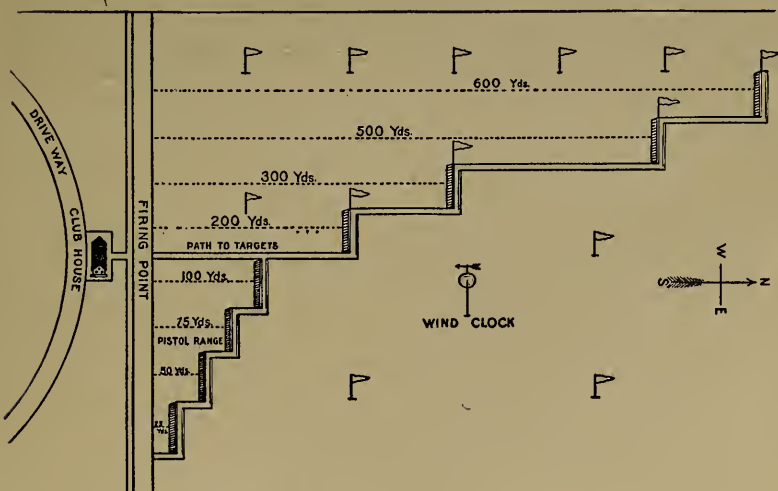


Target A. For Slow Fire at 200 and 300 yds.
Target B. For Slow and Magazine Fire at 500 and Slow Fire at 600 yds.

Target C. For Slow Fire at 800 and 1000 yds., may also be used in Practice with Telescope Sights at ranges of 1000 yards or more

Target D. For Rapid Fire at 200, 300, and 500 yards.

STANDARD MILITARY TARGETS USED BY THE U. S. ARMY, NATIONAL GUARD AND NATIONAL RIFLE ASSOCIATION



PLAN FOR AN OUTDOOR RIFLE RANGE

four years of the Camp Fire Club matches with the disappearing bear, very few of the 90 contestants waited until the three seconds exposure of the bear was completed, in most cases the rifle was brought to shoulder, the aim taken and the rifle fired in about 2 seconds, often $1\frac{1}{2}$, and there are always a lot of "possibles" made, with a number of contestants running over 40x50.

Battle fire contemplates not only good grouping of the individual shots, but a good dispersion over the zone of fire. All rifles put their shots in groups around the zero of the rifle, representing the average accuracy of the cartridge with perfect holding. This group or "cone of fire," as it is called, spreads at longer and longer ranges until at modern battle ranges it plays an important part in directing the platoon fire to cover a given area. If this cone strikes a terrain at right angles to the line of fire, like a cliff, the groups will be circles; if the terrain is sloping away from the line of fire the cones will be very much elongated and the danger zone of the bullet much increased. If, on the other hand, they strike a gentle rise sloping *towards* the line of fire the cone is much reduced and this is the safest position for a line of battle or line of rifle pits to assume. The further instruction of the military marksman goes towards utilizing the effect of this cone fire to the most advantage. It is part of the regular course undertaken by officers and platoon fire commanders, and represents the last development of the possibilities of the rifle before one gets into the domain of artillery. As it represents battle tactics more than rifle technique we have merely

mentioned the subject. Those interested in pursuing the matter further will find the course laid down in full in the "Army Small Arms Manual."

Getting back to the Springfield itself, a number of minor parts should become well familiarised by all citizens who wish to be posted on the use of a military rifle. The rear portion of the bolt, called the sleeve, is that part of it behind the safety shoulder of the receiver. It is the part carrying the sear notch which is moved backwards against the pressure of the mainspring by the cam of the bolt in the action of rotating the bolt and cocking the piece. The sleeve is screwed to the bolt and held from unturning by a small catch, which you press to release in cleaning the bolt. As a good deal of powder grime accumulates in the bolt during a lot of firing, it is necessary for every recruit to know how to clean the bolt. To get the bolt with its sleeve out of the receiver the cut-off, as the small catch which regulates the magazine is called, is placed in centre notch and the safety lock turned to a vertical position. Raising the bolt handle to vertical position, it can then be withdrawn, and we can unscrew the sleeve by releasing the little sleeve lock mentioned before. The sleeve brings out with it the firing pin and striker, and to get the latter apart, let down the tension of the mainspring by turning the safety lock down to the left, press cocking piece against your breast, and draw back the firing pin sleeve which will release the striker. The parts can then be cleaned and re-assembled. To get the extractor off the bolt, turn it to the right, forcing its tongue out of the groove and

then force the extractor off the bolt. It is held by underlugs on its collar engaging recesses in the extractor. To get it on again, turn collar until its lug is in line with the safety lug on the bolt, insert the collar lugs into their recess in the extractor and force it back on again, impressing the hook of the extractor against some firm surface.

A word as to the safety lock and cutoff. The former is a winged lug on the sleeve, marked "Safe" on one side and "Ready" on the other and its function is to lock the firing pin so that it cannot be driven against the primer by the mainspring. Under no circumstances should the piece be carried loaded, with the firing pin let down by gently releasing the bolt with trigger drawn. Such a course would lay it open to discharge with any heavy jar, for the striker would then be in contact with the primer, which it can never be if the safety is on.

The cutoff is a small locking wing, similar to the safety, and marked on opposite sides, "On" and "Off." Its function is to put the magazine into action or render the piece single loading. It simply stops the bolt from coming back all the way when "on," so that the next cartridge in the magazine cannot come up under the extractor hook. When in intermediate position the dismounting groove is open and the bolt can be pulled out of the rifle. The magazine has a floor plate hinged to it on the under side of the rifle by a tenon which permits it to be opened laterally. In the plate is a recess for the heel of the magazine spring which feeds the cartridges upward, and above the spring is the follower plate on which

the lower cartridges rest. When the follower rises to the top, it takes a position blocking the bolt when the latter is pulled back after the last cartridge has been fired, thus telling the soldier that his magazine is empty. Many a case of a bewildered recruit working his empty magazine in the excitement of battle is on record, and this arrangement of the follower was designed to prevent such episodes.

This about completes the description of our U. S. Military rifle, except for the sling strap and the butt plate. The latter has a covered trap door of steel, letting into a recess in the butt containing a wooden spare part container, with an extra striker, extractor and firing pin for use in campaigning in case these parts wear out in the stress of continuous battle.

A final dismounting required of the recruit is that of the magazine. The floor plate is first released by pressing on its catch with the bullet end of a cartridge through a hole in the plate for the purpose. The rear end of the first limb of the magazine spring is then raised to clear the recess in the floor plate and the same is done to release the follower. Clean and replace the reverse of the above, inserting the follower and spring into the magazine from below, catching the tenon of the floor plate in its recess and then the lug in its slot on the guard, when it can be snapped home by pressing the rear end of the floor plate forward and inward.

The three firing positions of Prone, Standing and Kneeling follow. Sitting position is given more latitude, in general with both heels in the ground, body upright, left elbow on left knee, the point of elbow in



LIEUT. WHELEN IN THE FOUR MILITARY SHOOTING POSITIONS
Top to bottom: Prone, standing, kneeling, sitting.

front of knee cap, while right elbow rests inside of right knee, the left knee being a trifle in advance of the right.

The Prone Position

Lie flat at an angle of 45 degrees to the firing line. Spread your legs wide apart, toes out and heels in. Flatten the middle of the body close to the ground. Put the point of your left elbow to the front and right. Raise your right shoulder and place your right hand on the rifle butt. Put the butt against your shoulder.

Put your cheek hard against the small part of the stock with the right thumb along, *but not across*, the stock. Spread your right hand and elbow out as far as they will go. Draw your body back, getting your chest and whole body as flat as possible. Grip the left hand under the rifle as far up as possible.

Rest your rifle hard in the flat of your hand, not on your fingers. The fingers should rest loosely. If you hold them tight the trembling will affect your shooting.

The Kneeling Position

The proper kneeling position seems unnatural at first. Your right knee should point directly to the right, along the firing line. Rest the point of your left elbow over the left knee. There is a flat place just on the underside of your elbow which fits another flat place on your knee, making a solid rest for your rifle. Lean forward, holding your rifle much the same as when "prone." The illustration shows

the correct kneeling position. Study it carefully, noticing the points mentioned.

If possible, get some experienced shooter to show you just how to take these positions. Then practise until they are natural for you.

The Standing Position

The picture below shows the proper standing position. Stand sideways with your right foot at the back and turned towards the right. Keep your left foot straight and hold your left arm against your body, using your body as a rest to support the rifle.

The better you begin, the better your final results will be. Don't let your eagerness to shoot lead you to neglect practising the proper shooting positions until they become second nature to you. Work at them until you take them naturally every time you aim a rifle.

How to Aim

After practising the position in which you are going to shoot until it becomes comfortable and easy, you are ready to take up aiming.

The first thing to remember is to bring your aim as quickly as possible upon the target and then immediately press the trigger with the first joint of the finger.

Do not shoot wildly without stopping to learn where each shot hits, because that does not develop your marksmanship and makes you only discouraged and careless.

After each shot, see where it hit and, if it is not a good hit, try to decide why not and what you can do to overcome the fault.

Do not get your eyes too near the rear sight or it will become blurred and bad shooting will result. Rest your cheek firmly on the butt of the rifle, raising the rifle high on the shoulder instead of lowering your head to meet the butt.

Sighting

Figure 1 shows how a good aim with an open sight looks. The top of the front sight is just below the bull's-eye. At the right you will see how the bull's-eye would appear if you could look at it through the barrel when the sight is in the position shown at the left.

Figure 2 shows how the sight looks when the tip seems too low through the notch of an open sight or too low through the circle of a peep sight. The result is shown in the illustration of the target at the right. The shot in both cases goes too low.

In Figure 3 you will see the result of shooting with the front sight too high. The bullet naturally goes above the target. If you do not hold the sight on the centre of the target the bullet goes to the right or left of the bull's-eye as the case may be. Figure 3 shows how the sights appear under these conditions with an open sight, and Figure 3 A shows error of the same kind with a peep sight.

Figure 4 shows the correct method of sighting. Always aim just below the centre of your target. This

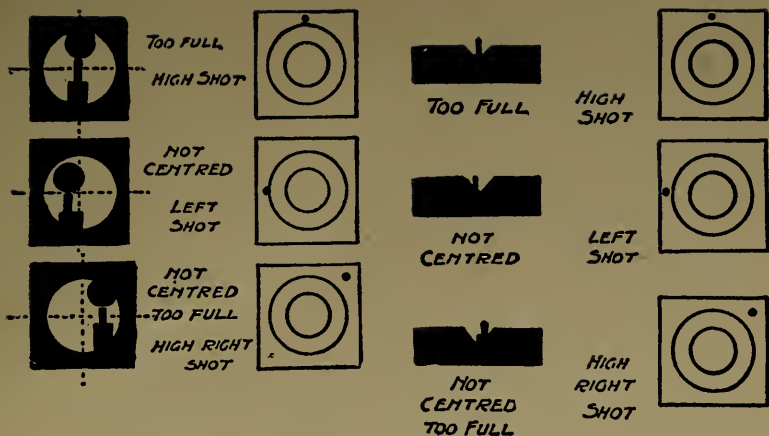
gives you a clear view of the target above the sight. You will have a better chance of seeing how the bullet strikes. You will also avoid the natural tendency of a marksman to shoot high when excited. Look at the mark and not at the sight. This makes for more accurate shooting. One of the most common faults in aiming is keeping the eye on the front sight instead of on the mark.

Never tip your rifle to one side or the other. This is a fault known in shooting as "canting" the rifle. The remaining pictures show the effect of tipping your rifle one way or the other.

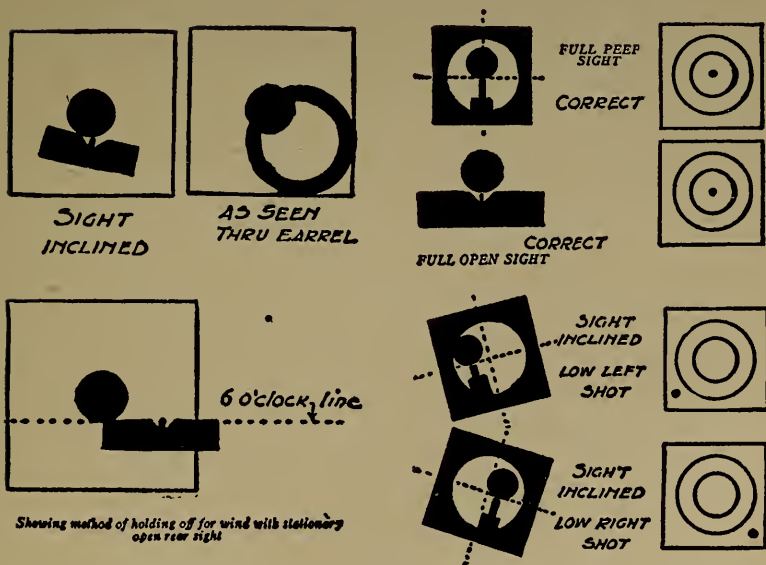
Hold your breath while aiming and do not aim too long. If you do, you will become unsteady and your eyesight will become uncertain. If you do not quickly bring your rifle into good aim, take it from your shoulder, rest and aim again. Do not look at the target any more than is necessary. When not aiming, rest your eyes by looking down on the ground.

Do not yank or pull the trigger. Press it gently.

The above represents, in condensed form, the army requirements in military rifle instruction, and has been done into vest pocket booklet form by the U. S. Cartridge Co., to whom we are also indebted for the diagrams on sighting. While much of it is useless in big game shooting, it all forms an excellent groundwork, just as a good course in trap-shooting forms a groundwork for snapping feathered game in the woods. Take this book into the fields with you, and go through the three firing positions in person until you *know* them, for mere book instruction is easily forgotten, whereas a little actual practice fixes the



FAULTS IN SIGHTING AND THE CORRESPONDING HITS ON THE TARGETS



WINDAGE, AND CANTED BARREL

CORRECT HOLDING AND EFFECT OF CANTED BARREL

scheme indelibly in your mind. You will need these positions occasionally in big game work, particularly in the Rockies for sheep and goat, where open standing shots at long range are the rule and you will not need the woods aiming ability until he begins to run. At the end of the stalk, you are still out of sight and unsuspected, and have plenty of time to assume the firing position that will insure a hit, and this the military prone or kneeling does for you. Yet, I have known many a hunter who never had taken the trouble to learn these positions and so used ones of his own, probably already tried out and discarded by the military authorities because of inherent faults—and he therefore missed! And the chagrin of missing a standing shot, with your guide looking on contemptuously, is as gall and wormwood compared to a fair miss at galloping game in thick timber.

The military rifle is equipped with a sling strap; a healthy, husky affair, long enough to be of use in scaling ramparts, and also to act as a steadier of your aim. Unlike the plain single sling, slipped under your left elbow as described in my chapter on rifle sights, this military sling has had a system devised for it in the Regulations, which system enables whole flocks of "possibles" to be garnered by its continuous use. Unlike my own big game sling hold, in which the left elbow is simply dropped through the loop and the fore-end grasped with the strap coming down across the *left*-hand side of the left wrist, the system devised by Uncle Sam gives an extra twist to the strap where it passes up from the elbow to the fore-end, so that it passes the *right* side of your left

wrist instead of the left. Try the two holds with your rifle, and you will soon see the difference. Of course it is seldom that you have time enough to wind up your left arm into the military sling hold, while the plain hunter's sling hold is instantaneous, but the military scheme *does* give a trifle more steadiness in the prone position. Using either of them in that position, I can lay the sights on a mark apparently much smaller than the top of the front sight, and hold them there without a tremor for a considerable time. If I were shooting a match I would use the military sling hold, for that trifle of extra steadiness might result in the one extra bull's-eye that wins the match. The sling also aids in both kneeling and standing positions, particularly the latter, where it compensates for the lack of steadiness brought about by modern, short, light barrels. Take the old deer rifle of the forties, a marvel of a venison-getter. You plant its heavy barrel on anything that you can see, and can go away and leave it there, so to speak, it lies so steady in your hands. Not so the modern light barrel, which soon wabbles and dances about any small mark, no matter how you hold, and, in a heavy cross wind this tendency gets so bad as to make you miss a lot. The sling corrects this fault, there being practically no difference in added steadiness between the military hold and the "hunter's hold," as I have dubbed the plain loop in distinction to the military double twist.

CHAPTER X

KNOW YOUR GUN

THE argument of this chapter is based on the much-observed fact that the old-timer, who gets meat every time he goes afield, is generally a man of one gun—one rifle, one shotgun, one revolver. But he *knows* them; knows every trick that they possess, and knows how to get the most out of each gun of which it is capable. Compared to him, the modern “sport,” with his cabinet crowded with fine guns, none of which he really knows anything about, is handicapped to such an extent that it is a wonder that he comes home with any game at all, not shot by his guide. For no two rifles shoot alike nor act alike, and shot-guns are even more temperamental, so that a few boxes of shells a year expended in practice can scarcely suffice to scrape even a bowing acquaintance with them, let alone a real familiarity with what the weapon is capable of.

In common with many another sport, I too rejoiced in a large cabinet of fine guns. They were great—to admire, and take out of the cabinet to show to friends—great for almost anything, in fact, but actual shooting! For the latter, but two of them could be depended upon to bring back the meat—an old Belgian double 12 and a Winchester model '92 .32-20 rifle. I

was raised with those two and knew to a dot what they could do. For the rest, there were two fine German doubles, a 12 and a 20; a fine choke-bored repeater 12 ga.; a Mauser bolt rifle 7.65 mm.; a Stevens single-barrelled 12-ga. trap gun; a couple of 22 rifles; a 20-ga. single and a 28-ga. Stevens single shotgun. Right now the cabinet holds three principal guns, a .35-cal. Winchester model '95 rifle, a Parker 12-ga. shotgun, and a Colt officers' model .38-cal. revolver. To these are added the .32-20 for Eastern deer and small furred-game shooting; the Belgian 12, saved for the Kid when he gets old enough to shoot it; and the 28 single shotgun, which he is using now. I made a clean sweep of all the rest, and am now humbly trying to learn *all* about the three remaining guns which I am using constantly.

Perhaps a brief explanation of the reasons for cleaning out the rest may be of interest to shooters, after which we can look over some of the progress made in knowing the guns that I have settled down with for the rest of my shooting days. To begin with the bolt rifle. A fine, accurate weapon. Made a perfectly rotten score with it the first match I ever went into, missing a bear as big as a cow three times out of five at 100 yards—a feat that I couldn't duplicate with the .32-20 with my eyes shut. Front sight turned out to be loose, making the rifle shoot two feet high and a foot to the right. Sighted her in, and in the next match at the same bear tied Jack Hessian on a score of 33x50 and won the match against 70 other shooters. So far so good. On real game in heavy timber she proved far too slow and clumsy to operate,

besides jamming more than once. How can you jam a bolt gun? Easiest thing in the world! Just fail to drive the bolt home, so that the extractor does not catch, run her back until she has a new cartridge out of the clip, and you have the prettiest jam in the world—one loaded shell in the chamber and another in front of your bolt, and mighty easy to get such a one, too, in the excitement of reloading a bolt gun with the game in plain sight galloping away from you. And slow—Lord! So I kissed her good-bye.

The two Sauer double guns were beauties and made like a watch—made so fine, in fact, that the first breath of salt air in the locks gummed their safeties and it cost three dollars a throw to get them fixed. You didn't have to get the guns wet; just take them down to Great South Bay or Barnegat and the salt wrack would do the rest. Impossible to get at the dummed safeties to oil them, too. Moreover, neither the 12 nor the 20 fitted me, and I couldn't hit a little bit with them. Try as I would, by no possible scheme could I drive my trap score above 13 or 14 with the 12, while with the 20 I did just 3x25 with it the first time, and then, after three solid years of practice with the 12, I thought of taking the 20 with me on an upland game-shooting trip and gave her another tryout. Result—3x25! Try as I would, hold high, hold low, shoot fast, shoot slow, she refused to hit the clays. Needless to say that gun did not go with me on the upland game trip. Finally, after a particularly exasperating day afield with the 12, when I missed seven easy chances at quail and missed a rabbit coming right at me—both shots—I decided that we must

part. It was no fault of the guns; another man whom they fit is making good scores with them now. But they didn't fit *me* and one of our experts at the club, a 25-straight man, made just 8 with the 12 the only time he tried it. Both of these guns had $3\frac{1}{4}$ -in. drop at the heel and were fitted to me according to the best German practice on the subject. I bought a Parker that did fit me, and my scores jumped at once to 21 and 22.

The Stevens trap single went because I do not care to own two guns, one for trap and one for field. One gets little enough practice as it is, and that very expensive, so that the gun that you *must* know like an open book is your field gun, using its left full choked for the traps. Otherwise it was a fine little gun; made a 20 with it; a trifle muzzle-heavy for me personally, but very good for a beginner at trap-shooting who takes it up for its own sake rather than as an accessory to field shooting. The repeater was something of a surprise. Three times I had had it out afield, always missing abominably with it, until finally, when I had scored twelve straight misses on black-bellied plover with it, I went back to the old Belgian and peace reigned once more. The gun stayed in the cabinet for six years, when one day, in a fit of exasperation at making a couple of sevens with the German double, seemingly having dropped back with it from 11's and 13's instead of making progress, I took the repeater down to the gun club. A score of 13x15, followed by a 21x25, was the pleasant surprise that this gun gave me. She was specially bored for trap-shooting, with an extra-tight choke, as patterns made

with it subsequently proved. Besides, it fitted me, with a drop of $2\frac{1}{2}$ inches, and it had a light, easy-swinging barrel. I sold it only when sure that my new double could do quite as well with its left barrel as the repeater with its single barrel.

The single-barrelled 20 was sold because it was an abortion as a fit. With a $3\frac{1}{2}$ -inch rifle stock it would fit neither the Kid nor me. It cut up his face at the third shot he fired with it, and as far as I was concerned I never could hit a pigeon with it, no matter how I held.

The mystery of why the cheap old Belgian of my boyhood days was sure to come home with the meat soon came out when I patterned it. A mild, open pattern, very evenly distributed and covering about a 40-inch circle at forty yards, explained why, with even indifferent holding, she would score. At the traps she showed up badly with 7x25, but most of the game of twenty years ago was shot at around 25 yards, which was just about right for the Belgian's pattern. The repeater shot so tight that at twenty-five yards her whole pattern could come inside a 24-inch circle, giving you only 12 inches of leeway for a miss.

Having boiled my arsenal down to one shotgun, one rifle, and one revolver, I called in a priest and was married to all three forthwith. My reasons for choosing the three brides were all based on practical field considerations. I had an individual preference for the mechanical construction of the shotgun chosen, although any one of the five other best makes of American guns would suit me nearly as well, provided that they fitted me and were bored so as to

give a first-class pattern. Also, for the .35-cal. rifle, because of its power and the fact that its supplementary cartridge takes the .38 short, which also fits my revolver. I have seen much big game that required a whole lot of killing with the .30 Gov't '06, but as a rule one shot from the .35 tells the story, and it doesn't make much difference where you place it either. As to weight, all modern rifles weigh about alike; a half a pound more or less one way or the other is inappreciable on the trail; nor is the alleged kick noticeable when really firing at big game. Tell me the hunter who even remembers whether his rifle kicked or not when the moose went down! As a matter of fact, twenty shots from the .35 kick one about the same as 20 shots with the 12-ga.—which is certainly no great matter! All this talk about a man carrying a "cannon" just because he prefers a large bore is based more on theory than fact. The .405 is, in fact, quarter of a pound *lighter* than the .35, because bored out of the same barrel, and both of them are but a trifle heavier than the .30; while the .44-40, .33, etc., all large-bore rifles, are exceedingly light—much lighter than small-bore guns purporting to be in every way superior. Give me a good punch, and the ability to land that punch, at any range up to 300 yards and any speed up to full gallop—and you can keep all the other rifle advantages for military range consumption! The real thing to do is to *know* the one rifle that you *do* settle upon, instead of theorizing around with a new rifle every year.

As for the .38 officers' model revolver, I preferred it to any form of automatic for the reason that the

revolver is an intensely practical institution with me, its value being measured more by its meat-in-the-pot producing capacities than by any theoretical quick-fire, offensive-defensive qualities. Where can you find a revolver that will pick out the bull at fifty to one hundred yards or snake a grouse out of a tree any more neatly than the .38 officers' model with long 7½-inch barrel? And, if you get to close quarters unexpectedly with a grizzly, you will not make him peevish with your revolver fire, as you most certainly would with the .32 S. & W., the supplemental cartridge for the .30 Gov't '06. On the trail you cannot go loaded down, with *both* revolver and rifle—it just isn't done by practical people—since also a belt-axe is essential as part of your equipment. But, in the Rockies, one shouldn't be without either one or the other weapon, no matter what the season. One experience of running into a flock of grizzlies when armed with nothing but a trout-rod, as happened once to a friend of mine, will go far towards curing the disarmament theory in wild country. And, as the .38 met all the above conditions, I chose it for my revolver.

There was a lot to do with those three weapons before the next hunting season set in. I had to get acquainted with all three of them, and *know* what they would do in the various propositions supposed to be good medicine for various conditions afield. The rifle came first. Raw and un-Christian, just as she was, with the factory sights on her, I took her up to camp and—made three disgraceful scores with her: a wild 21x50 offhand on the military target at 100 yards, an 18 on the disappearing bear, which

animal is in sight three seconds at unexpected intervals, and a 17 on the running deer, which means I hit him once in the shoulder and once in the loin, missing him three times. Didn't know my gun; didn't know a thing about her. Besides, she was smooth and unchecked, so that one's sweaty fingers slipped on the fore-end and tang; she had no strap; and her sights were a joke.

First, the sights. I wanted a tang peep, not a receiver peep, because the latter is so far from your eye that in dark or dismal light your eye cannot see through it. The folding tang peep, usually sold for this model rifle, is so placed by its base on the tang as to just avoid the bolt end when the lever throws it back. Very nice—for the bolt. But no thought seems to have been expended upon the shooter's eye, into which the peep is sure to kick and put the optic out. Result, the salesman assures you wisely that "we do not recommend a tang peep on our model '95s," and does his best to sell you a receiver peep. But Lieut. Whelen had told me of the tang peep on his .405, which he had ferreted out from among the sight-makers' products, so I gently but firmly led that young salesman down into the cellar and made him go over with me their full stock of flexible peeps. We found what we wanted; a peep set well up on the tang, the model '94 type, if I remember correctly. The salesman shook his head. "Bolt will run into it," he declared sagely. "What if it does?" I retorted, "that's what the flexible feature is for, man!" So we put it on and returned the one usually sold for the model '95's. Even at that the .35 kicks back far

enough to just touch my eyebrow with the rim of the peep, and the one sold for that gun would surely come back into the eye itself, for it sets fully $\frac{3}{4}$ inch further back on the tang.

The front sight will do very well as sent from the factory. It is a small silver bead, securely set in a pyramid front sight. All it wanted was a 45-degree flat filed on it with a fine file, so as to throw the skylight back into your eyes at early dawn and dusk and also prevent shooting off the light in broad sunlight, as the round bead sight is always making you do.

For the supplementary sights I put on a double folding leaf sight with white pearl triangle on one leaf and V on the other. Both of these folded flat when the rifle was being used with big-game cartridges. For a strap I chose a bronze swivel buckle secured to the fore-end by a plate inside the wood, into which machine screws lead from the base of the buckle. I do not care for a rigid buckle secured by a pin and collar to the barrel itself. It is not comfortable nor flexible enough. This rigid buckle will answer well enough at the butt end of the strap, where no tendency to twist ever comes on the strap, but at the shoulder end you want the swivel feature. The strap itself was of soft, broad leather, $1\frac{1}{2}$ inches over the shoulder, tapering to $\frac{7}{8}$ in. at the buckles. It was just long enough so that one's elbow could be slipped into the loop when raising the rifle to fire. I find that such a strap is a great aid to steady holding, particularly in a cross wind, as it enables you to "freeze" your muscles against the tension of the strap and the compression of the gun butt.

With the rifle so equipped but not yet checked on tang and fore-end, I went into another match of four events, winning the bear with a score of 44x50, making a 34 with the running deer (two hits in shoulder, two in lungs, one clean miss in front), and a 30 with the bounding antelope, which means three hits and two misses. This beast is some hard to hit, for his rump is only about eighteen inches in diameter and he bobs up and down at unexpected intervals, and you can fire your five shots at will, taking as many cracks at him at a time as possible—for you may not see him again! With the same rifle I lost out on the Mountain Sheep event at 300 yards, because I was still prone to hold as in military shooting—*i. e.*, with the bull's-eye showing above the sight. Hunting rifles are sighted to hit where held on big game, and if you lift the sights into the ram's body you blot him out almost entirely at that range. I chose to hold under him, firing at the last instant as the sights rose on his body, with the result of putting the whole group under the animal's belly. However, I was beginning to feel somewhat acquainted with my rifle, and now started in on the supposition of unknown ranges, drawing coarse or fine, as the case might be, and targeting the peep so as to learn just what one of its divisions meant in inches of elevation at various ranges. Of course, there is no time to do this sight changing in the game fields, but an accurate knowledge of it is useful when, say, you have completed a stalk on sheep or goat, are still out of sight, and have plenty of time to set sights for an estimated range of from three hundred to three hundred and fifty yards.

Beyond that sheep are not shot, as a rule—at least, you've got to show me!—for the simple reason that the front sight is then a good deal larger than the animal. Up to that range the old-timer simply draws a "leetle coarse," as he knows by experience just what his rifle will do with varying coarseness of sight.

The next study was the supplementary. There are two of them made for the .35, the brass-chamber supplementary, shooting the .38 long, and the steel supplemental with a clip up near the top end, which holds the .380 automatic. I tried out the first, because its cartridges would go in my revolver without necessitating taking along another breed of ammunition. The groups were fine—four inches at 40 yards offhand shooting—and I won a grouse shoot with it against good old John Dietz, of Olympic fame. Along about the third box of cartridges the extractor came out, bringing with it the *head* of the supplementary cartridge! Now, then, you're out in Wyoming, eighty miles from a railroad, and have just shot a grouse with the supplementary. Its head coming off has put the big-game rifle out of commission and you are to get out the rest of that headless shell with such tools only as are found about camp. I confess to having a fairly complete assortment of small tools with me on the trail and I tried them all. At the end of two hours that supplementary was stuck tighter than ever and I was all in, with the rifle ruined for the rest of the trip—Know your gun! A friend of mine had this very thing happen, also, and it cost him four dollars at a gunsmith's to get the barrel off and the shell removed by heating the barrel. As

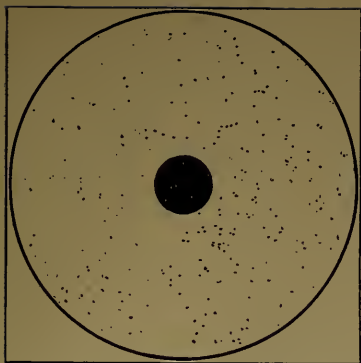
for me I simply said, "Moral: bring along a steel shell extractor," for that is what solved the difficulty in a jiffy. Never again will I go into the mountains without one after that lesson! At the same time I had the Marble Arms Co. send me their steel supplementary, since the .38 long brass supplementary has been taken off the market because of the weakness of its head. This was strong and sure, the whole body of the shell being hard steel with a firing pin down the centre. The .38 automatic cartridges (rimless) fit in the end of this shell, which places them well into the rifle lands of the .35. Using the pearl triangle leaf sight, I got group after group with it at 40 yards not exceeding three inches, and the noise of the cartridge is quite insignificant. For grouse, rabbits and ducks along the trails in the Rockies it will be first class. On my last trip I used the .38 revolver and armory cartridges in the bolt rifle for this work, both of which were rather noisy though accurate enough.

Turning to the new shotgun, a few tries at the traps with standard loads showed that I was on the right track, for my scores at once jumped to 17, 19, 20 and once a 22, which was an unheard-of feat for me. I had one day afield with her up North, when everything went lovely, and then I took her down to South Carolina on a quail and woodcock shoot. Before going I made one experiment with her. As sold over the counter both barrels were tight choked, as revealed by trying a ten-cent piece on them. It looked bad for my right barrel on the rise of the covey, but there was no time to have the right bored

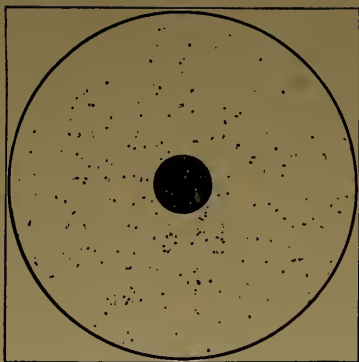
out to medium choke, so I decided to try "brush" loaded shells in the full-choked right. Trying out these shells at the traps, I missed twenty-five straight—an unheard-of feat—at least, I never heard of even a beginner missing the whole twenty-five! I tried snapping them the instant they showed over the trap-house; holding near and holding far ahead; under and over—every conceivable trick that I knew to produce a hit, but all in vain. The rise is at sixteen yards, and before the quickest shot can find the bird he has gone at least twenty yards more; total, 36—out of range of the brush load. And yet the patterns exhibited herewith do not show very much scatter, about 40 per cent choke. I tried those shells on quail on that trip, but gave them up at the end of the second day. For rising coveys they did not seem to produce results, probably because I am no snap shot. But I invariably missed with my right and killed with my left, if the birds had not already got into cover. About noon of the second day I shot a quail with the left at 40 yards who pitched into a vine-covered dead tree just after being hit. I went into the swamp after him, and when I got under the tree I saw that he was still very much alive and would probably get away unless shot again. Then I bethought me of those brush shells. Pacing off eighteen yards, I raised the gun and fired one. Down came the quail and when I picked him up there were just three pellets in him, one of which must have been the original pellet which had wounded him. A standard shell in the full-choked barrel would have minced him at that range.

This explained the mystery of the brush shells—too open a pattern for more than eighteen to twenty yards in thick brush—and the patterns herewith of 8's at 30 and 40 yards made with brush shells bear this contention out. During the rest of the shoot I used standard loads in both left and right barrels, often missing with the right because the covey bird would be too near. The pattern of 369 No. 7½ pellets in a 24-inch circle at thirty yards, made with the full-choked left (85%), explains this. The gun shot far closer than I could hold at this distance, and thirty-two pellets in the 5-inch bull showed that I would have minced the bird, anyhow. So, on my return to the city, I proceeded to get still further acquainted with my shotgun by having her right barrel bored out to medium choke. As roughly measured by a 10-cent piece, this widened the barrel to a scant 1/32 inch more than the diameter of the coin—just about the same as both barrels of the old Belgian double. Patterning it, I got 353 No. 7½ pellets in a 30-inch circle at 30 yards (82%), twelve of which found the 5-inch bull's-eye. Stepping off to 40 yards, I gave her the full-choked left, with the result of 337 pellets in the 30-inch circle (78%), fourteen of which found the bull's-eye. Incidentally, I might point out that the brush shells gave 257 pellets (57%) in the 30-inch circle at thirty yards and 187 (41%) at forty.

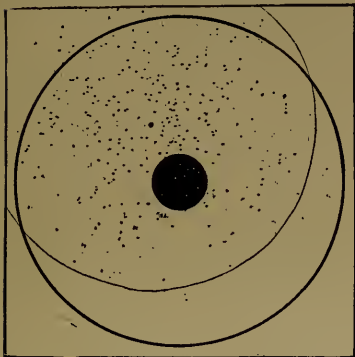
Would that medium-bored right be good medicine with doubles at the traps? The answer to that came at the next tournament I went into, where I scored 22x25 at the main event (highest score of my life, so far) and 17x25 at doubles. Also, 11x24 at the



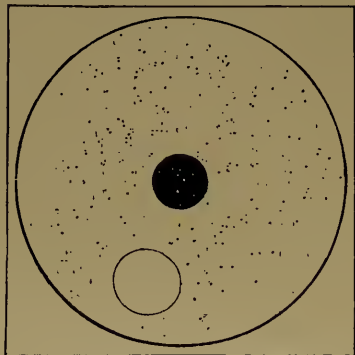
BRUSH LOAD IN FULL CHOKED LEFT
AT 30 YARDS. NO. 8 SHOT



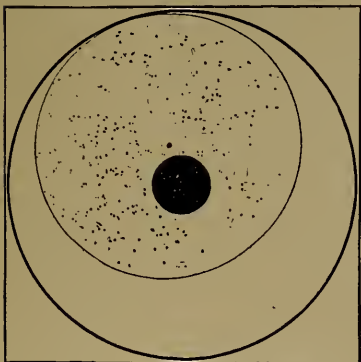
BRUSH LOAD FULL CHOKED AT
40 YARDS



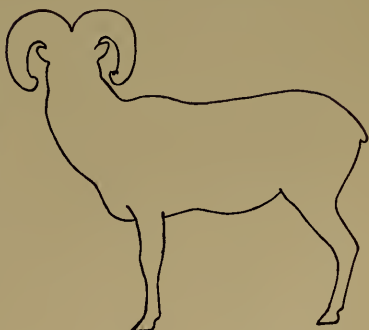
MEDIUM CHOKED RIGHT AT 30 YARDS
6 INCHES OFF CENTER HOLDING



FULL CHOKED LEFT AT 40 YARDS



FULL CHOKED LEFT AT 30 YARDS
IN 24-INCH CIRCLE



MOUNTAIN SHEEP STANDING
TARGET AT 300 YARDS

quail shoot and 8x15 at the hand trap. This last event is lots of fun and quite difficult. The hand-trap man stands behind the shooters and calls "Mark!" as he throws the birds. Where in blazes the bird may be is up to the shooter to find out, and many a ludicrous miss and many a difficult hit shows up during the event. The medium choke was just right for this sort of work, provided that you found the birds quickly and put it right on them with fast gun. Slow fire always lost the bird.

The next question was what that left could be depended upon for ducks at 30 and 40 yards, and what the right could do for ducks hovering over the stools at 18 yards or jumping up from them at 30 yards to top of rise. Patterns at 30 and 40 yards with the medium right and full choked left, shooting 4's, were made. Both gave about the same results, the right putting in 112 pellets at 30 yards and the left 115 pellets at 40 yards, either good medicine for a duck who would himself half fill the 30-inch circle. Some of these patterns dropped as low as 80 pellets, showing that 5's would give a more uniform pattern in this particular gun. Tests on shooting true to sights and hitting a stationary blue rock with swinging gun brought some more facts into the ring of Know Your Gun. Some of those old relics put their patterns from six inches to a foot off centre; the new gun put hers dead on if you could hold with a rifle sight. But, as some of the patterns here show, it is the easiest thing in the world to shoot off centre from three to six inches at a stationary object with a shotgun, making an astonishing difference in the pattern as regards

pellets in the bull's-eye, and this is, I believe, at the bottom of the beginner's many misses with the shotgun. Unless naturally expert, he has a good many hundred practice shells to fire before arriving consistently in the twenty squad. To swing with the bird accurately, to lead him accurately, and to still centre your pattern on him is a fine art not to be learned in a day, and certainly not with a gun that does not fit. And, in the game field, this fit is even more essential, for in the excitement of shooting at wild game you go right back to first principles and point the gun naturally, with no time for the eye or brain to correct faults in alignment. And the result is that your gun does not point where you think you are aiming it, and a clean miss is scored. In the present state of our game, particularly in the North, the chances at game are so few that not many misses can be permitted without the hunter coming home with an empty bag.

As to the revolver, there is little to say about her. I once made a fine score, 45x50, with a cheap revolver at the 15-yard range. Next morning I went out with the standard target for the 50-yard range, confidently expecting to repeat the performance. The score showed, with the very same holding, an inclination on the part of the revolver to miss the target altogether, nor did fifty cartridges bring to light any further details except that the cheap revolver would sling its bullets two feet or more off your holding at 50 yards and was absolutely unreliable. After going over what I wanted my revolver to do for me on the hunting trial, I bought the .38 officers' model and proceeded

to get acquainted with it. We have been staunch friends ever since. She had no sight changes to make nor trigger adjustments, nor any monkey business whatever. All you had to do was to get to work and learn how to shoot her. What can be done with that revolver let the Kentucky plate-shooters at 100 yards attest. During the three years that I have been shooting her my scores have climbed steadily until they now run between 65 and 68x100, on the standard American 50-yard match target with 4-inch bull ring. Out West she kept a camp supplied with fresh grouse for three weeks, and occasionally produced a rabbit, shot on the run. At the man-killing target she has twice scored 17x25 and once 23x25. Only once have I doubted her and that was one year at a match where I made what appeared from the holding to be three successive bulls, but which were each greeted by a waving of the score stick indicating a total miss of the target. At the third of these I lost faith in my old friend and proceeded to sight coarse and high, with the result of two fours above the bull. An examination of the target found all the rest of the shots in the bull, which was evidently the last place the score-boy thought of looking for them, so I protested the score and demanded a second shoot. But that is not all of that yarn: while waiting for my turn to come around again, at the tail of the procession, I entered a quail shoot at the traps, tied my opponent and had to shoot off. Coming back to the revolver range, I took up the good old six-gun and started after some more bull's-eyes, but, alas! the ice-cold arm that was once so steady was now hot and quivering, shot

to a frazzle with fifty shells in the 12-ga., and, try as I would, I could hardly score on the target at all! In addition to Know Your Gun—Know Yourself!

In match-shooting, never perform any violent exercise with one set of muscles if you're going to use another in shooting. Never pull the trap's lever for the squad if you are just going into an important event yourself in the next squad; never shoot rifle or shotgun just before attempting a revolver score; never run a race or indulge in violent exercise just before going into a difficult rifle match. You simply cannot get your body quiet, and it is a still body that makes possible a fine rifle score. A strap helps a lot, and, as many a big-game shot is offered after a violent race or climb, the only way to avoid misses due to pounding heart and bursting lungs is to have a quickly set strap and train yourself to a style of rifle-shooting that co-ordinates eye and trigger finger to let off with quick aim at the precise instant that the bead is on the animal. The military style of firing, with gun on top of thumb and forefinger and trigger "wished" off while holding dead under the bull, explains why so many world-renowned military shots will miss a bear as big as a cow at 60 yards after a chase over mountain slopes and down timber that would tax the lungs of an elephant.

Know your gun! One rifle, one shotgun, one side arm, if you will, but know what they *can* do over the whole range of their capacity and how to get results with them. It's the secret of the old-timer's "git thar" meat gun that comes home with the game and lets mighty few fighting chances get away!

CHAPTER XI

THE MAN'S GAME OF TRAP-SHOOTING

"YESSIR, it's a man's game!" chortled the enthusiastic New Member, excitedly ripping the side off a fresh box of cartridges. "You can have all your tennis and your golf—me for this! I love it!" He slipped the box of shells into the pocket of his canvas trap belt and picked up the prize new trap grade pump gun from the rack just as the squad hustler came through bawling parodies on the names of five club members. "That's my squad, and bully boy! I've drawn my pet position for an opener!" he yelled, prancing out to the No. 2 trap platform and taking his stand at No. 5 position.

He was in great form that afternoon—full of sparkle, snap, the old pep—that sure, easy, joyous confidence that smashes 'em all. Four right quarters whizzed by him and were maced one after the other without a miss.

"Gee, son, you're findin' 'em easy to-day!" grinned the veteran at No. 4, delightedly noting that this smashing right quarters was becoming a habit with the N. M.

"Sure! Just can't miss 'em!" chuckled the New Member, walloping the tar out of a straight-away, his fifth and last bird at No. 5. He raised the gun

muzzle and stepped behind the squad to the No. 1 position. A strong northwest wind was blowing, from which the clubhouse had shielded him at No. 5, but at No. 1 the full force of the gusts whipped about him. He had just time to load and lay the piece when No. 5 fired and it was up to him to call "Pull!" The bird ripped from the trap-house, a fast straight-away, and just as he was going after it, the wind tipped his hat nearly over his eyes. A little thing, but enough to make the scorer call "Lawst!" and break the winning streak. His next two birds were the meanest that can be shot out of a trap-house—"wild" left quarters at the No. 1 position. Our trap-shooter did not know that, being a novice, but he knew that he missed them both, and immediately that old pep, that superb confidence, that just-can't-miss-'em, began to evaporate. In spite of jamming his hat down over his ears, the wind would still lift it just enough to make him nervous, and he tried so very hard for his fourth bird—a right quarter and easy from No. 1—that he missed it also. For the fifth bird he had to call "Pull!" three times, drawing broken targets the first two, so that by the time the third bird finally got off, the strain of concentration on the rise had grown so acute as to make him miss again.

Disgustedly he moved on to the No. 2 position, and this brought the Old Veteran alongside him again at No. 1.

"Missed every damned bird at No. 1," growled the N. M., his ears going white with nervousness. "Bum work; only 50 per cent so far."

"Yea, I seen ye stabbin' the air full of holes,"



SCENE AT THE GRAND AMERICAN HANDICAP TRAPSHOOTING TOURNAMENT



THE TRAP PULLER AT WORK



TRAPS OF THE ASBURY PARK GUN CLUB
Shooting the clay pigeons out over the surf.

chuckled the Veteran. "You want to take it easy, son; don't let nothin' get y'r goat, no matter what else ye do. Y're just goin' to break every blamed bird 't No. 2. See 'f you don't!"

"Pull!" croaked the N. M. It was a right quarter, mild angle, and he blew it all to bits.

"That's the talk!" cheered the Veteran. "Just see what ye done to that one! Now get all the rest and ye'll go out with 20."

The New Member prayed stoutly for a bunch of easy ones to restore his nerve, and the kind fates sent him two straight-aways, another right quarter and a wild left quarter, the latter being the only one that got away scot free.

At No. 3 he was on easy street and broke all five, as pretty much everything looks like a straight-away from this position, and at No. 4 he poled over two fast right quarters, dropped one straight-away and got another and, to his intense surprise and satisfaction, nabbed a sizzling left quarter dusting away apparently at right angles to him.

"Well, I got eighteen, anyhow," he peeped cheerily at the Old Veteran, as they left the stand. "It's a man's game, I tell you! Me for another go!" He went over to the squad window and chucked in a quarter. "Put me down for the next squad, will you, Jimmy?"

Yes, sir; it's the most exhilarating game there is. The man that tells you that trap-shooting is as monotonous as jumping over a stick a hundred times—you might kick it down accidentally four times and thus get a score of 96—simply doesn't know the first

thing about trap-shooting. Usually it is the expert on wild-fowl shooting that makes this crack, but I notice that you never find him even in the 80 per cent class in the big tournaments. Just think what you have to do to add up 96. In five squads, from five different positions, with all kinds of angles of flight, usually in gusty weather, you have to break 23 to 25 four times and make at least one 25 straight. Only those who have shot week after week at the traps know how infernally hard that is to do. Oh, yes; it's just like jumping over a stick—once in a while you might accidentally miss one! Well—try it!

Trap-shooting as a sport is one with rifle-shooting, archery, bait-casting, revolver-shooting—a combination of skill, nerve, and eyesight that enables you to hit a chosen mark. Since the world began man has always felt a certain thrill and pleasure in striking a distant mark with a missile; he is the only animal on earth that can do it; it's his badge of superiority over tooth and claw, and the thrill is so deep in the blood that it never fails, no matter if you pulverize the flying clay for the thousandth time, puncture your hundredth three-hundred-yard bull, drive your *n*th arrow into the gold, bean the centre float with a wooden plug, or shoot out the last bit of black out of the pistol bull. You never tire of turning the trick—when you do it!

This is at the basis of the fascination of trap-shooting. If it were easy to hit every one of 'em, the sport would soon pall; but it's not. The best man in our club is still reaching out for a consistent 25 straight. He gets one every once in so often; gener-

ally, though, he hangs up 24 or 23. And his trouble is—straight-aways! He never misses either right or left quarters at any angle, but in almost any string a little pop straight-away is likely to sizzle out of reach before he can nail it down, and so spoil his 25 straight; for the straight-away is a deceptive beast and is out of range before the deliberate man can hold on him. What he probably needs is a little more speed.

Another man worried along on 16's and 18's without material improvement until he had his gun straightened and a couple of ivory sights put on. He then astonished the onlooking world with a run of 50 straight, and is now seldom out of the 20 class. Yet the day before this was written he did only 11, showing how even the winners have their off days. Oh, yes; trap-shooting is as easy as kicking over a stick! This shooter leads 'em a mile—according to his own version, "two miles." In other words, he is slow in swinging; wherefore a gusty day at the traps or field-shooting in brush and thicket would be apt to knock him off the Christmas tree.

And, as for "us dubs," among which is cheerfully classed the writer of this tale—we who have never, never been guilty of more than 22 out of 25—we have everything the matter with us, from "nerves" to sloppy holding. Trap-shooting is just like golf or any other game of skill—too much butting in of The Brains will spoil any score. By this I mean that the action is far too swift for mental control such as one uses in deliberate rifle fire, and to hit the clay consistently you must depend largely upon that subconscious training of eye and muscle called "form."

Which brings us to the schooling in how to acquire it. Watch an inexperienced golf player addressing the ball. He makes a mountain of labour of it forsooth; expends a ton of energy getting his stance; measures at least five times his club distance; swings the brassie aloft ever so carefully, his entire mentality concentrated on every movement; and then the stroke, resembling somewhat a paralytic reaching for his crutch, and the net result is a badly mutilated green and a 50-foot bounce for the ball. He is attempting to do the impossible, to mentally direct every action of his muscles in driving that ball. It can't be done; the action is too swift and the mind rather interferes than helps.

Along comes the veteran; he gives one glance at the ball, another at the distant green. There is a graceful, apparently careless, upward sweep of the club, a powerful, accurate stroke, and the ball soars over the field, and bumps, skips, hops and rolls onto the next green. Hole in two. Easy!

Now, observe the beginner at the traps. Intense mental concentration in every feature; ears and lips gone white with nervousness. His turn comes to call "Pull!" and the gun is jammed to his shoulder and forcibly held over the trap-house. Every ounce of will-power he owns is looking over that barrel. What is he thinking about? Oh, everything! He's worrying about his score, worrying over what kind of a bird he's going to get, worrying over his shells, the fit of his gun, and, more than all, just plain scared to death. But, above all, his mind is determined to see that the gun is pointed right at that bird, no matter where it

goes. Pull! A left quarter shoots out over the landscape; there is a wild, wobbly scramble of the gun muzzle after the scurrying bird, a second more careful sight in the general neighbourhood of the target, a late pull of the trigger—and the scorer sings out “Lawst!” in that cheerfully aggravating tone that scorers have.

Along comes the Renowned Professional. He points the gun—it isn't even at his shoulder yet—he lets out a yelp intended to mean “Pull!”, there is a quick wiggle of the gunstock, a spanking report, and the bird is ground to powder before it gets fifteen yards from the traphouse. And the answer to it is—Form; that subconscious training of the muscles that do the work under the eye's direction, so that neither requires more than general supervision of the brain instead of its direct assistance. Form is gotten by learning right in the first place, and then sticking to it until it becomes second nature.

And there is no one correct form in trap-shooting, as there is in golf. Every man has his own particular style of holding and swinging that is his one best bet, and the thing to do is to develop that until you can swing and fire in your sleep. However, there are a few fundamental principles that nearly all shooters are agreed on. First, holding your gun butt well in, on the chest rather than on the shoulder muscles. This enables you to swing your body right or left with equal facility, neither way introducing any fatal cramping of the muscles.

Second, fast swinging. Learn to swing with the bird, leading him not over a foot or so, and firing as

you swing. It is fatal to stop, and it is also fatal to do as some shooters do—aim at a guessed point in the line of flight and snap, hoping that the charge and the bird will collide. Some very good shots do this, just as you would throw a stone ahead of a flying tin can, aiming at a point where you think the two will collide. And the average man has just about as much chance to shine with the clays that way as he has to scintillate as a pebble-caster.

Third, good, fast timing. I'd rather miss the whole twenty-five and get off every shot inside of one second than get a few of them by pottering around. The clay flies about 30 yards in the first second. It starts 16 yards from your gun muzzle, so that if you get off your shot in four-fifths of a second you will get him at 40 yards in a straight-away and 28 to 30 yards in quarter birds. If you potter around much the straight-away will be 46 yards away in a second, 54 yards in $1\frac{1}{4}$ seconds (and your chances of hitting him are now as thin as frog's hair); wherefore you simply *must* be prompt. Get the habit of fast timing, even at the sacrifice of some accuracy at first. You have acquired good form when you can hold accurately in good, fast, even time. Having this drilled into your subconscious muscular system, your brain is free to exercise judgment on such matters as lead, windage, shot drift, etc.

As to lead, in quartering birds, suppose you reach him in 30' yards. Now, the velocity of your shot is about 1,000 feet—330 yards—a second, so that it will get there in one-eleventh second. Assuming that you have learned to swing right along with your bird and

have gotten over checking the gun as you pull the trigger, if you lead apparently two feet ahead it will be about right for a left quarter from the No. 1 position, as will be noted by the accompanying diagram of a blue rock hit at the end of the first second, angle of flight being 30 degrees from the normal. The bird flies four feet to every one of your apparent lead; during the time the shot is getting there it will have gone eight feet, wherefore two feet of lead will centre it in your target. As you take the same bird from the other positions, the lead grows less and less until you hold nearly dead on him at No. 5. The reverse is so of right quarters taken from No. 5 back to No. 1. This diagram also shows pretty conclusively that with correctly swinging gun and fast timing very little apparent lead is necessary—not over $2\frac{1}{2}$ feet in even a “wild” bird of 45 degrees angle. I say “apparent” lead, because from trap positions you do not actually hold ahead of the clay, but to one side of it in the direction it is going, as will be noted from the diagram.

Having acquired form, the next thing is nerves, or “nerve,” whichever way you take it. Getting back to the story of the New Member again, his first move after joining was to get into the little 10-shot practice squads which infested the No. 2 trap. Nothing to scare him there; plenty of other dubs, all climbing hopefully, with maybe an old stager or two to brace them up with a steady string of consistent hits. He gets the glad hand all around; his squad is called, and before he knows it he's out on the platform, looking jocularly over the barrel and “bustin'” every one as

they rise, without half trying. No strain, no worry, no gasping breath, no over-trying—just poling out a hit every time he calls “Pull!”

Too easy—just can’t miss ’em. Along about the seventh shot an easy one gets away and he suddenly wakes up to realise where he is and what he is doing. Old Man Nerves gets back on the job again, and his body becomes rigid, breathless, concentrated, paralytic with self-consciousness. Gone is that easy, masterful swing that got him the six straight, and in its place we have an anxious, nervous human, trying ever so hard to get Nos. 7 and 8, and missing them both. Ten he lands by a broken chip, and goes out with seven when he should have ten straight.

He rushes back to the score window and enters the next squad, determined to do a straight run or die, and by the time his turn comes to go out on the platform he is in a frenzy of impatience. He gets No. 5 position and—fires his gun immediately after calling “Pull!” before the bird even appears at all, too nervous to notice the pressure already on the trigger finger. Just about there he “blows up,” as they say of a baseball pitcher afflicted with the same trouble. He’s all on edge, all on tiptoes; has the wobbles, wandering gun muzzle, lost shell, safety on—every known disease that can upset a trap-shooter—and he finally sneaks away too ashamed to look his score in the face.

A plain case of nerves. Shows what they can do to a man who was just about to run off ten straight. And the answer to it is—Prevention. Don’t *have* things to annoy and upset you. Get a good trap belt, with a pocket for the box of shells, one side of which

you rip off. You'll never then be feeling around in a dozen pockets for a lost shell; and the last one of each layer of five tells you when to move on to your next position. Get a trap vest or coat with a pad to keep your shoulder from being hammered up, or else get a recoil pad and put it on your gun for the same purpose. Its added stock length will be no detriment in trap-shooting, where a long stock is rather an advantage. Either way, you'll note the advantage of the protection the very first long run you make, for, at the end of the first 25, the pound is sure to tell on your shooting. And do not neglect a barrel protector, or else a glove for the left hand. No man can shoot well when pestered to death with a pair of red-hot gun barrels, nor can he save the situation by attempting to shoot with a kerchief in his left hand. And they *do* get hot on a sunny summer day, particularly if shooting doubles.

Another line of toil in shutting out the nerve jinx is to make the aiming game easier. If your gun has a $3\frac{1}{4}$ -inch drop, straighten it to $2\frac{1}{2}$ inches. If the glare of bright sunlight and glistening gun barrels annoys you, get a pair of amber glasses. They'll clean out your shooting eye a lot, anyhow. If you have a tendency to twist the stock and throw the top rib out of alignment, by all means put on a pair of ivory bead sights; some shooters prefer the rear one red. And then, give a little thought and study to the shells, powder and load you use. I've had a mate at the traps face me with trembling lips and twitching muscles after doing a score of only 7 out of 25—a good holder, too—simply shot all to pieces, hammered to a

frazzle by the heavy loads he was using. Yet the big bruiser next to him had just whaled out a 21 using the same load. Never feazed him at all. There are some powders so violent that they will "get your goat" and give you gun headache in the first string unless you tip the scales over 150. Others are mild and pleasant to use; but, for a light-weight man, 3 drams of powder and $1\frac{1}{8}$ -ounce shot are plenty for consistent work, while $3\frac{1}{4} \times 1\frac{1}{4}$ will ruin him. And don't neglect ear protectors or cotton wads in your ears. It makes a vast difference in your scores whether or no your raw ear drums are being pounded by that incessant discharge of the squad guns. Try it and see.

If you are using your pet double for trap shooting, find out which barrel has the heaviest choke and use that exclusively. Learn to hold close enough to hit consistently with it, rather than use the wide scatter of the other barrel. You may hit more at first with the latter, but in the long run your full choke will give you the fewest unaccountable misses, and even its pattern is none too close for the elusive clay.

Be careful about doing other muscular work than trap-shooting when your squad comes up off and on all day. I've seen a man's performance utterly ruined because he good-naturedly consented to pull the trap during the absence of the trap-boy. It is hard work, that regular swing of the lever and squeeze of the release, and it put his shooting muscles so off their form as to make him lose most of his next twenty-five birds.

The final jinx to chase out is the which-trap quandary. Modern clubs have but one—an automatic.

But if your club starts in with three, donated by various members, they will be arranged and pulled on the Sargent system, set four feet apart behind the screen. Generally you hold fair over the one trap in the trap-house and come up with the bird, but with three traps it is wise to keep tabs and hold over *your* trap. Otherwise you'll have to swing a matter of four feet before getting into the line of flight of your bird, and there is no time to do it.

To the writer's mind, if you can afford it, a grand way out of all these jinxes is to buy a trap grade gun and leave the field gun without any trap specialties. This is not so expensive as it looks. While wonderful high-priced trap guns are to be had for from one to three hundred dollars, for about thirty dollars you can get trap grade repeaters, especially stocked, bored and designed for trap-shooting, and they are really splendid arms, too, many a trap tournament championship being credited to them.

Assuming that the foregoing screed has awakened in the reader a burning desire to hit the trap-shooting thing, your first move would be to own a trap yourself or join the local gun club. For \$6.50 you can buy a very good trap, shooting all angles, hand loading, and a barrel of blue rocks costs \$2.50 for 500. All you now need is a shallow-box, an open field, and a friend to pull for you, and you are ready for practice. Be sure to peg your trap box down with stout stakes, for the rearward kick of the trap will take all the drive out of the bird unless it has something solid to kick against.

Shoot fifty straight-aways, beginning about ten

yards from the trap and working back to the standard distance of 16 yards. Then fifty right quarters; then fifty left quarters. Now do ten birds of each, moving from No. 1 to No. 5 position every two shots. You will find it makes a vast difference which position you shoot from. And there will be certain birds from certain positions which will get away again and again, and the only way is to shoot twenty or fifty of them in a string, studying each shot. All of this special practice you cannot get at the club. I never saw a squad yet that would consent to shooting even ten left quarters or right quarters exclusively, for the good of the practice. There is sure to be at least one man out of the five to whom that particular bird is "soup," and it is not fair to ask him to spend his good money smothering ten of them. With the home trap you can work out any hard bird until the muscles which swing on him get over their awkwardness.

Lone practice, however, is tiresome compared with the fun that three or four good fellows can get out of the same shooting, so your next move will be to look up some kindred spirits, get together three traps and fix some shooting dates. Some one loans the use of a field, or a beach or pond shore is selected, and the crowd chips in enough to buy rough hemlock boards for a screen. This should be 3 feet 6 inches high and 16 feet long (the merchant length of the lumber), and the screen should be double, with the cracks of one set covered by the second set. Behind this screen are the three traps, screwed to three stout stakes driven into the ground for each trap. They are set four feet apart and the pull ropes led out through holes bored

in the bottom board. With the centre trap as centre and 16 yards as radius, a circle is then struck, and No. 3 position staked out perpendicular to the board screen. Positions 1, 2, 4 and 5 are then laid out on each side of No. 3, 6 feet apart. A good way to locate these permanently is to drive in a rough post of bark timber or rough 3x3 square lumber at each position, standing 2 feet high from the ground and topped with a square board to set a box of shells on. You now have all that is essential to run off any shoot the crowd prefers; in fact, the Camp Fire Club for years has pulled off all its tournaments with no other equipment than this, and there were never less than fifty entries. With it they hold the Novice Shoot, Quail Shoot, Club Championship and several practice shoots at every Encampment. Three boys are needed to run the traps—a puller, who sits behind the squad and sets the traps off in turn; a scorer, perched on an empty blue-rock barrel, and a lynx-eyed referee, to call “Lost!” and “Dead!” And almost every year the boys chip in to get some well-known “pro” to come up and coach along the novices. He sleeps in a tent during the entire encampment, piles right in on all the horseplay, and has a rip-roaring good time, the while dispensing words of trap wisdom and seeing that the shooting goes smoothly.

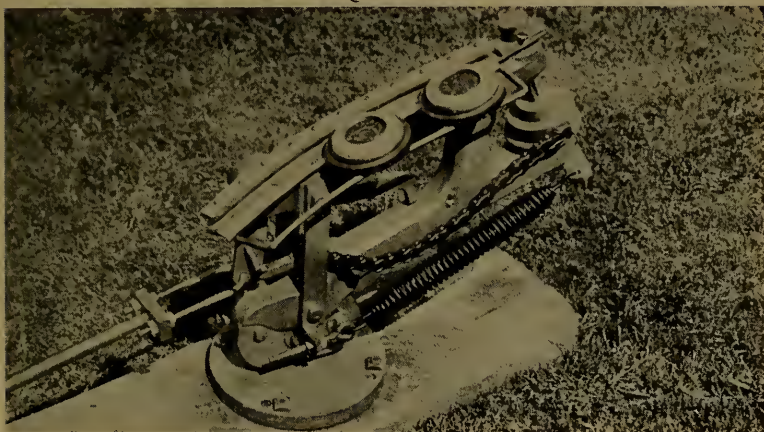
The next step toward permanence is some sort of a shell and blue-rock shack. The simplest one I know of is at Sea Girt, where a skeleton pergola effect presides over the field and is gay with an awning roof during shoots. If I recollect right, there is also a watertight locker for storing the traps and left-over

blue rocks. The next step—and it is usually soon taken—is the installing of an automatic trap. This requires but one boy to operate, and needs a house over it about 6 feet wide by 5 feet deep and 3 feet 9 inches in height. A pipe leads back to the pulley lever, with a stout telegraph wire inside of it, connected to the release catch. The puller makes a forward stroke with the lever, engaging the arm of the trap inside the trap-house, and then pulls back on the lever, thus putting tension on the spring. Meanwhile, the boy in the trap-house drops a blue rock in the carrier. At the command “Pull!” the puller squeezes the release catch on the lever, which sets the arm free inside the trap-house, and the bird flies out. While the puller is reaching forward again with his lever, the boy in the trap-house changes the angle of throw of the trap and gets another clay ready. Such a trap can be either hired or bought outright from two different companies, and can be worked as fast as a squad can fire, taking either singles or doubles. The house for it is best made of inch yellow pine sheathing, nailed horizontally to the four corner posts, outside of which is $\frac{3}{8}$ -inch tongue-and-groove wainscoting nailed vertically. The roof has a pitch of about 4 inches and is covered with “Induroid” or “Rubberoid” roofing. A front door of wainscoting, hinged along the bottom, opens out flat on the field in front of the trap-house, and, when closed with a padlock up under the eaves, effectually locks up the trap and the stored piles of blue rocks inside.

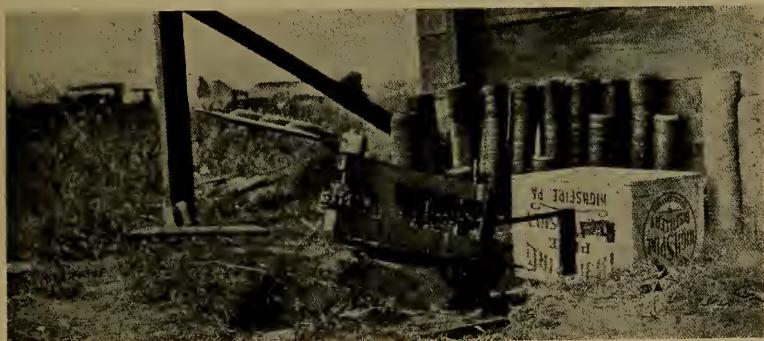
Let me tell you the story of the organisation of a certain club that is now one of the strongest in the



THREE CLAY BIRD TRAPS SET BEHIND BOARD SCREEN ON THE
SARGEANT SYSTEM



DOUBLE-TARGET AUTOMATIC CLAY BIRD TRAP



INTERIOR OF TRAP HOUSE

country. When the writer built him a home in the forest of Interlaken, one of his first inquiries was about the status of trap-shooting in that locality. Well, it was the way it usually is—up at the township centre there were a few enthusiasts who got together occasionally for a shoot; down at Deal Inlet was a struggling organisation with four active members who brought their traps down Saturdays and set them up on the beach. I did a little sporadic practice with my own trap and gradually met one man after another interested in trap-shooting. Suddenly the talk crystallised into action. A few leading spirits in the Asbury Park Fishing Club went to work with the officers of the Deal organisation and called a meeting at the Information Bureau on the Boardwalk on the night of December 21, 1912. We had thirty-two men present that night, and proceeded to form the Asbury Park Gun Club. The first thing those thirty men did was to sign a petition to their Congressman, asking his support for the McLean-Weeks bill for Federal protection of migratory birds. I had nothing to do with instigating this; it was done entirely on their own initiative, after an appeal by E. C. Burtis, secretary of the club and game warden of the township. At that time the bill was on the Special Senate Calendar and needed every ounce of support it could get. I had just come from Washington, where things looked pretty blue, and was more than delighted to find spontaneous support coming up this way. It goes to show what trap-shooters will do of their own initiative for game protection. I gave them a few

words on the McLean bill and then every man present stepped up and signed the petition.

Next, we fixed the entrance fee at \$2 and the yearly dues at \$1.20. That put the treasurer in possession of about \$90 in funds which he was authorised to spend on lumber and three automatic traps. Permission was given us to use the beach in front of the Deal bathing pavilion during the winter, and the pavilion itself as a clubhouse, shell-room, etc. Shooting captains were then elected and instructed to get up a shoot for New Year's Day. The committees then got busy and built two trap-houses and a screen for a third trap; firing platforms were built of old lumber picked up here and there along the beach, and on New Year's Day the first shoot was held. It was a corker. The membership had jumped up to over a hundred and every one turned out. There were ten events of fifteen birds each, cash and merchandise prizes, practice events—all three traps busy all day long. An old sand pirate was on hand in the upper floor of the pavilion with huge vats of clam chowder, unlimited pie, and unbeatable biscuits—all free on the club. Quite a gathering of ladies watched the shooting from the glass-enclosed upper pavilion, and, though the day was blustery and cold, we had a great time.

After that the club held regular shoots Wednesdays and Saturdays, with big tournaments on all holidays, the largest of which was the three-day shoot during the Easter holidays. The membership had jumped to over 250, and the city of Asbury Park began to take interest, donating \$300 added money to

the Easter shoot. Realising the spectacular nature of trap-shooting, the city fathers determined to have it for a feature of their celebrated Boardwalk. We had to move somewhere, as soon as the bathing season opened at Deal pavilion, so the city drove piles for us out in the ocean in front of the Boardwalk, on which the trap-houses were placed level with the Boardwalk. A handsome clubhouse was made over to our use, and firing platforms built out beyond the public railing of the Boardwalk, with runways leading from them out to the trap-houses. We held a grand shoot on moving day, and the trap-shooting of our club is now one of the spectacular features of the Boardwalk, one of the attractions of Asbury Park, and always draws a crowd. The pigeons go sailing out over the surf, you have a good skyline to shoot against, and it's always cool and pleasant, even on the hottest summer day. Personally, I never miss a Saturday shoot. I never used to win anything, because my whole left side seemed to be afflicted with creeping paralysis, so that if I got eight left quarters (and I generally did—sometimes nine) my score was pretty sure to be 17. It's my fetish, that left quarter thing, but I love the game, knowing that some day the jinx will be chased—and then me for our 20-or-better squad! And since this was written I have made it, 20 to 22 is now my average.

CHAPTER XII

CLAY BIRD PRACTICE AFIELD

To my mind the clay pigeon trap, properly used, is the only practical thing for training in wing shooting. The outfit shown was evolved after considerable experimentation and consists of a blue rock trap (Expert No. 1), bolted to a shallow box 24 by 36 inches, a small boy to pull the trap, a child's express wagon, sundry packages of clay birds and certain boxes of shells loaded with $7\frac{1}{2}$ chilled. I live, as do thousands of other gunners, in a section not too crowded, yet within town limits, so that it is at least a half-mile to the open fields—too far to carry a heavy trap. Various attempts at field practice in likely spots near my house simply resulted in stirring up a nest of anxious and indignant farmers. An automobile would have solved the problem, but being under a vow to live and die a poor man, heaven bless you, I have none. Besides, the cart can go where the auto cannot—along woodland trails, out into rough fields and the like.

A little thought will convince you that the practice to be had with the clay pigeon trap much more closely approximates real wing shooting than any scheme for firing with swinging gun at a stationary mark or at such marks as tin cans thrown in the air. Neither

in any way resembles real bird shooting, but the trap, if intelligently used, can imitate nearly every trick of feathered game, and in a shallow box can be set down anywhere with a couple of stakes driven in back of the box to take the kick of the trap.

Not only that, but the tyro has still more elementary lessons to learn; the arts of quickly and accurately training his gun upon flying game, of acquiring a uniform swing, and of releasing the trigger at the precise moment in the swing. Also unlearning the rifle trick of closing one eye, and, furthermore, getting accustomed to following a miss with one barrel promptly with the second; in addition to which judging distances and angles, getting the snap and swing of good gun work—in a word, all the habits which go to make good shotgun form. Nowadays we get so little opportunity in real field work to acquire this form, shots being few and far between in a day's hunting, that the proper place to work it up is in the field with unknown trap, unknown angles and concealed puller.

And it is good sport, too. I'd rather put in a morning at it than any other game I know of—golf, tennis, or even baseball, not excepted. As a primary lesson, arrange your trap in an open field grown high with goldenrod or short cornstalks. Lead out the pull string to the rear and have the boy conceal himself in the goldenrod, first letting him set the trap at any angle and any elevation that suits his fancy. You now walk out into the field on the *qui vive* for game. Suddenly there is a *cherk* behind you, for all the world like the scurry of a quail getting up, and a clay

saucer hurtles through the air, right or left quartering, or, mayhap, overhead. If you are a novice you will throw your gun wildly to shoulder and snap off with half an aim, but the beauty of the scheme is that the bird is in reality very near, not over 15 yards, and is going comparatively slow, having made a good deal of its flight, so that you have all the time that you need to swing ahead and pull, realising all the time just what you are doing, and being able to judge how and why you hit and how and why you missed. The flight of the clay pigeon gets slower and slower as it falls, and it will still be in range when it alights, so that you have ample time for the second barrel if you miss with the first. This method teaches you quickness in throwing your gun into alignment upon the flash of the birds into the air, steadiness in taking time enough for an intelligent aim, and form in gun swinging, not stopping as you pull, but swinging along the line of flight so that the second barrel can follow the first immediately in case of a miss. If a beginner persists in snapping off half-cocked, take his shells away from him and give him twenty-five birds with empty gun until he learns to take time enough for an intelligent aim.

Having acquired proficiency and steadiness at close ranges and slow birds, the next step will be what is called the "Quail Shoot." Choose a field for this full of brush and scrub pines. Conceal the trap behind a bush and lead out the pull string straight behind you. Now walk up on the trap with ready gun and the boy will pull when you are about six yards from the bush. The angle will be unknown, but you

have plenty of time, for even a slow gun can get on his bird in a second and a quarter. A clay pigeon leaves the trap at about 25 yards a second, so that the saucer is only 31 yards away when you are on it, leaving you half a second to putter around with your aim before the pigeon is out of range. With an Excelsior trap, slinging two saucers at once, good beginner's practice at doubles can be had from the "Quail Shoot."

The tyro should now be ready for standard trap work. In spite of the sneers of veteran wing shots, clay bird shooting is not easy, particularly for beginners. I have known many of them to drudge along for a hundred shells without doing over six or seven "deads" out of each twenty-five. To get in practice for regular squad work, conceal the trap behind a bush as before and take your position sixteen yards to the rear, with the puller behind you. Line up your piece carefully, holding directly over the bush, and call "Pull." The bird will rise from behind the bush and you follow up the line of flight, swinging the gun faster than the speed of the pigeon, and, just as you see that little disc swimming over the sight, pull. You'll get him.

Why? Because your gun is swinging faster than the bird is going, and during that instant that your hammer is falling and the trigger releasing you have swung ahead and automatically got your lead. If you halt the gun you are lost. The whole secret is speed. You have no time for change of angle of swing, nor for a wabby second sight. In one second the bird is out of range. It is a tiny object, only four

inches across, smaller than any winged game that flies, and beyond 38 yards even the pattern of a twelve opens out so that your chances of getting more than one pellet on the saucer are slim, while sixteens and twenties are out of the question except to those already expert at quick pointing. I have timed many crack squads at the big meets, and they all let off within four-fifths of a second from the time a bird appears above the trap shed. The saucers are broken at 18 to 22 yards from the trap, which gives the extreme range that an expert will uniformly kill at, at from 34 to 38 yards.

Knowing the importance of time, you will then endeavour to swing accurately and let off promptly when you catch your birds—no wobbling or pottering to verify your sight, but strong, decisive work, hit or miss. Better a miss than a bird caught on a fluke out of range. Your previous practice with slow birds and short ranges should have got some gun speed into you, combined with your acquired steadiness and intelligent aiming. Try fifty birds straightaway and fifty right and left quarters. If you are not hitting more than ten out of twenty-five, better move up to twelve yards until you get the hang of it.

When you arrive at a consistent twenty birds out of twenty-five, unknown angles, 16 yards, go and join the nearest gun club; and before you go let me whisper a few precepts of trap form in thine ear: First of all provide you with a leather or canvas shell box holder. It is simply a belt with a square pocket in front, which just fits a box of twenty-five shells. Tear off one side of the box exposing the upper tier of cartridges

and you will have no delays in reloading. Get an old glove for your left hand or else a barrel protector, for your first twenty-five will heat the gun so as to distract your attention from the business in hand—breaking every clay. Next is squad etiquette. It is unpardonable to delay the regular Bang! Bang! Bang! of the squad for any cause whatever. Practically the only allowable method of getting the other fellow's "goat" is consistent missing in a crack squad, which usually gets on the nerves of the others. However, when you step into a squad of shooters, have everything ready for your string of twenty-five, and get up a cast-iron determination to break every single saucer. When the man next to you is firing, lay your piece carefully, seeing that the front sight is square and true on the centre of the rib, and hold directly over the part of the trap shed where your trap is located. Right after he fires, call "Pull!" catch your bird as it rises, climb after it and give it to him as you go. If you missed, either you halted your gun, didn't swing true, crossing the line of flight instead of going along it, twisted your gun, or didn't catch your bird on the trigger accurately as you swung up to him. If there is a wind, allowance must also be made for wind drift—one to three feet or more. Most beginners make the fatal mistake of not knowing which is the next trap. On the Sargeant system there are three traps, pulled from left to right. If the man next to you gets No. 2, you will certainly see a bird fly up from No. 3. Now if you hold in a general way over the centre of the trap shed, you are forced to swing the gun four feet over to No. 3 and *then* up after the

bird. There is no time to do this, and as a matter of fact you will swing the gun in a circle like a runner tearing around second and third bases, and when you find your bird your gun is swinging one way and the pigeon going another. Result, a wobbly aim, a halted gun and an inevitable miss.

Wherefore be sure and keep track of the traps and lay your piece over *your* trap before the man next to you calls "Pull!"

If you are going to do much trap shooting, better take your gun to a smith's and have two ivory beads put on, the large one in place of the front sight and the small one half-way down the barrel. Align these to show but one bead when you hold over your trap, leaving you nothing to do but follow up and smash your bird when you call "Pull!" Enough, in all conscience.

If these white beads are good for trap shooting, why not for field work? The answer lies in the same basket with why $7\frac{1}{2}$ chilled only and why the gun at shoulder when calling "Pull!"—trap shooting calls for very accurate sighting on a very small target. There is no time at 16 yards from the traps to get your gun to shoulder and still have time to find that infinitesimal speck and kill it before it gets out of range. In the same way the *raison d'être* of $7\frac{1}{2}$ chilled—it is the one pellet that will give the densest possible pattern with the heaviest shot that will surely break a clay saucer if two of them hit it. The size was, as it were, invented especially for trap shooting. Two No. 8s will not do it with any certainty, and I have picked up many a pigeon with a neat hole in it

punctured by a single No. 7, said pigeon having been called "Lo-orst!" by the scorer. In one of the last numbers of a late lamented contemporary, a writer advocated field practice at clay birds with fours, sixes and eights as well as $7\frac{1}{2}$ s. Don't you do it, for you haven't a chance with fours unless your saucers are something the size of a mallard duck, and as for eights I once knew a wing shot who horned into a trap squad with a twenty-bore loaded with No. 8s soft, under the impression that his smaller shot would compensate for his smaller bore. He broke his first three straight, and we all sat up on our hind legs and flopped up our ears, for here was sure a wonder gun-pointer,—but as he lost the remaining twenty-two birds (some of which really *did* hop), our interest merely became academic again. Jack Fanning, who was present, remarked that with such a load he could hardly have done better himself, eights being too small to break a saucer with any regularity, and soft shot not only giving too open a pattern, but losing such a high per cent of the pattern through deformed pellets.

In field work there is no time to align ivory beads, nor is your gun at shoulder when the game gets up, so the matted rib and the brass front sight are your main dependencies. For the tyro the first thing to do is to see that his gun fits him and then train his arm muscles to bring the gun to shoulder in true alignment every time—that is, with the rib lying horizontal to the eye and the sight fair and square centred with the rib at the breech. Practise gun alignment by pointing at this, that and the other mark, and do it again and again half an hour daily until it becomes

automatic. You cannot do this unless the gun fits you, and you can try this out at the gun store by looking fixedly at some object, shutting the eyes and pointing the gun. Upon opening them you should see the object just over the sight with barrel and rib flat and true. If you see the whole barrel, a long streak of rib, and even the breech, the gun has nowhere near enough drop for you. If you see nothing but the breech and have to raise your head to catch the front sight, the gun has too much drop. Try another gun until fitted, or, if you must have that one, the gunsmith can fix it for you by bending and cutting the tang.

Having gotten the lay of your piece off your mind, the next step is to go after freedom of vision. No man can judge distance with one eye shut, for it is a principle of optics that a lens throws all objects into a flat plane, and the eye is no exception. Neither can you half see what the bird is doing with one wing of your vision shut off. If you want to be master of the situation, you must put both eyes into it. You will find, on putting the two-eye aim into practice, that the gun and its muzzles are more or less of a compound blur, but that the front sight is tolerably distinct, since the master eye, your right, is on it. You are now in the hands of the Lord as regards alignment of your gun, as your eyesight is concentrated on that bird scorching along out in the field; but you are still conscious of that gleaming front bead, and, if your previous training in laying the piece has been faithful, all will be well.

To my mind this is the ideal form for wing shoot-

ing. As a psychologist would say, the subconsciousness takes care of aiming and alignment, leaving the brain free to attend to seeing, distance and lead.

But there is yet a higher plane, the so-called "gun-pointing" system, adapted to wing shooting by Dr. Carver. It is described as being in a class with hitting an object with a stone or a bow and arrow, no aim being taken, but the gun being pointed as one points a finger. Except for very short ranges and large marks, I am inclined to be sceptical of any gun-pointing system that pretends to ignore the sights. Both with rifle and revolver the gun pointer in reality aligns his sights and centres them under the mark as he pulls, or he can take off the sights and centre the barrel under the mark, but in both cases there must be the consciousness of an alignment. The reason is obvious; an eight-inch bull at fifty yards is a good deal smaller than a revolver sight, and a hair's-breadth variation either way means a miss. No man can point off-hand within a hair's breadth.

I met one of these wonder gun pointers once, and the story will bear telling. He owned a Colt breech-loader bearing the date of '71—one of those dear old six-guns with the barrel sticking up above the chambers, a little swing hatch on the side for loading and a fixed spring ramrod alongside the barrel to push out the shells. His father had carried it as a cowman all over the West, and it had more nicks on its handle than there are fleas on a greaser priest. The kid was a youth of great heart and high enterprise, for he began telling me how he could hit beer-bottle tops with it at twenty-five yards, every shot.

"Indeed and indeed," quoth I, "you are a man whom it is a great pleasure to meet and from whom much advancement might be gained. Now, I own an officer's model .38, with all the latest refinements, and if you will get that old war gun of yours we will debate the matter on my fifty-yard range."

We did. The kid was some scared when he actually faced the standard target at fifty yards, and muttered something about "Hain't never shot this-yere gun at no such range, nohow."

I stepped up and made a mediocre score—there was a nine, two sevens, a six and a five—and then the kid came to the bat. He flashed off his string just about as quick as the gun could be pulled, and we rushed forward to garner the bull's-eyes. Alack and alas! There were but two shots on the target; one in each upper corner, by courtesy in the three ring; one lodged in the tree trunk above, another hit the billet of wood which held down the bottom of the target, while the fifth had gone from amongst us forever! I forbore to put him up against the same target at twenty-five yards, but made the mental reservation that those beer-bottle tops had been hit at twenty-five *feet*!

"Let's see that six-pistol, son," said I when we got back to the fifty-yard range again. I laid it on the bull. "Man alive! your front sight is three times as broad as the whole bull. Now take your time and centre your sight carefully on the bull before you let off."

He did, scoring an eight and a seven, showing that the Colt product of '71, after forty years of use



A FINE ITHACA 12 GAUGE SHOTGUN



TITE L. C. SMITH ONE-TRIGGER DOUBLE 12 GAUGE SHOTGUN

and abuse, was quite as reliable as the fine weapon of 1912—though I would scarce care to back the old boy against the 100-yard proposition. Some day I'll go further into the matter with that kid and we'll get a story out of it.

Now, I have had more or less trifling and inconsequential experience in rifle rapid fire, including seventeen shots in 1½ minutes, scoring 70x85, with the armoury sub-target Springfield, and the point I am driving at in all this is that while gun pointing with a shotgun is excellent as far as it goes, do not stare fixedly at the mark and whang away without any aim other than your ability to point a gun, but let your eye retain general guidance, and do not let off until it tells you that your sight is truly on the bird or has reached the proper amount of lead. The eye is instantaneous; it is the trigger finger and guiding muscles that take time and training. Wherefore do not abandon supervision of your sights when you acquire a reasonable proficiency in gun pointing; you will gain no time by it, and you will lose the advantage of centring your pattern on the small flying mark.

While you may not get many transverse shots in upland shooting, with ducks and snipe such shots are frequent, as snipe invariably come to decoy down, wind, wheel and pass over the decoys facing the wind. Just at this point they usually discover their danger, and you get a cross shot at top speed, which is some twenty-five yards a second. With ducks, both in pass shooting and point shooting, cross shots and overhead shots are hard ones, and the speed is anywhere from 35 to 45 yards a second. For these reasons your

nearest stool should not be more than 18 yards from the blind as your shot at 300 yards a second will take 1-15 of a second to reach the nearest decoy and 1-12th to reach the farthest, during which time a snipe will have flown two yards and a duck nearly three. In one-half a second he is out of range, and, training on him as he comes across, you will need nearly all of this to swing, get your lead and pull the trigger. With gun swinging twice as fast as the bird, you will not need to lead the snipe over a foot and the duck four or five at 25 yards.

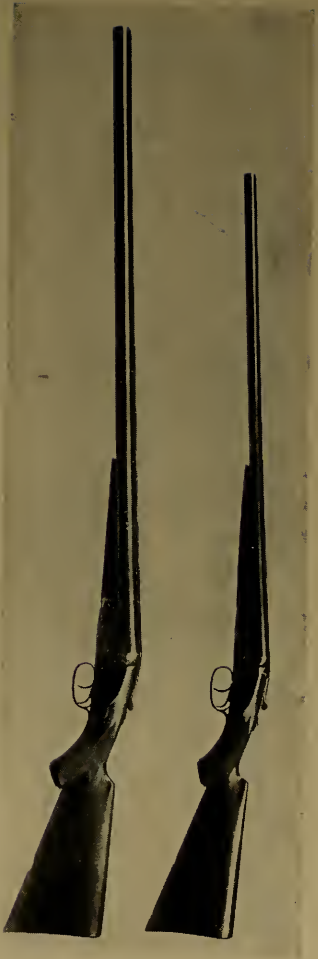
For practice in cross fire arrange your trap just inside the woods and shoot the pigeons out into the field. The shooter walks about on the alert, and when one of the yellow saucers sizzles out, your stunt is to come to shoulder, swing along the line of flight, pass the bird and let off when you think you have lead enough. It is fast work, and you need not be ashamed of 50 per cent misses. The trap, as usually set, throws the clays at 25 yards a second, but you can tighten up the spring to do 35 yards, which is some swift duck. Of course you stick to $7\frac{1}{2}$ shot for this work,—you are shooting at a 4-inch blue rock saucer, not a 22-inch duck. Your general position should be about 20 yards from the line of flight and about 15 from the edge of the woods. The boy lets off without warning as you walk about, and I found the average kill to be 28 yards from the place where the shooter stood when firing to the nearest fragments of broken target. Another variation is where a hedge divides two fields, and you put the trap in one of them while you flourish around in the other, snapping the

oncomers as they hurtle over the screen. The puller is concealed in the hedge at 45 degrees from the line of fire, so that by no possible chance can he come within gun fire. These shots, coming head on obliquely at you, are the hardest of all, yet many a time you get them in the blinds when a bunch of mallard or willet come right on high over the decoys and pass overhead. A mallard will usually tower if you shoot ahead of him (the classic miss with incoming birds), and the willet will set all aback, jump three or four feet, and make a swerve before continuing his flight. In either case a ready and accurate second barrel is what is wanted, and the best training for it is incoming quartering clay pigeons with the field trap. Make up your mind that you are quite likely to miss the critter with your first barrel, so be prepared to wheel and give him the other as he flies past.

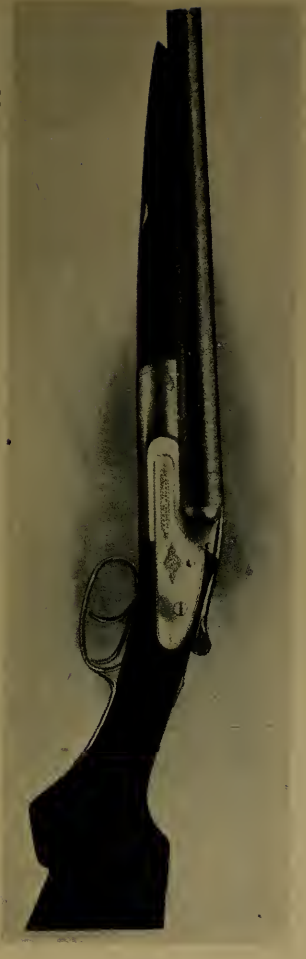
Brush shooting is the supreme domain of the swift and spiteful twenty. Her pattern is as dense at 30 yards as that of the twelve-gauge at 40, with penetration slightly superior,—and you are lucky to get a sight of a bird in the brush more than 30 yards from your gun. In spite of much advice against a light gun, I would say the lighter and shorter the better—something between five and six pounds, with 26-inch barrels. My own specimen weighs 5½ pounds, and I have shot fifty shells in a day's shooting with it without my shoulder ever knowing there was a cartridge in the gun. You want speed in the brush; something that you can carry all day without being aware of it, and something that will fly to your shoulder with the quickness of pointing a cane. As a matter of fact,

you are on your bird one-fifth of a second faster with the twenty than it is physically possible to swing a twelve. With quail, woodcock, jacksnipe and rabbit, where the game lies close and the ranges are short, the twenty is a pure joy, but I would not recommend it for grouse,—at least not in their present state of wildness. Most of those that I have had arguments with got up at least 15 yards from the gun, and you were lucky to pull them down inside of 40 yards. What you want for them is a sharp-shooting twelve, or a hatful of shot from a ten-bore, which is still thick enough to garner him after being combed through 40 yards of twigs.

However, to get back to the trap and the twenty, drive in three pegs anywhere in a suitable patch of woods and screw the trap to them. The pegs should be at least three feet long to get enough grip on the forest duff to stand the kick of the trap. Drive in a semicircle of low bushes, concealing the trap, and then let your boy note a similar circle of trees and bushes ten yards from the trap. Now let him conceal himself behind a tree with the pull-string taut and you walk up on the trap looking for trouble. The instant you pass one of the ten-yard trees or bushes he pulls the trap; but your first intimation of something doing will be the sudden *hjkrrr!* of the trap and a small yellow-and-black saucer sailing out of those bushes. It flits through the trees and behind branches, and, believe me, if you don't smash it in the first 25 yards you haven't a chance! The 16-yard range is hopeless—too big a handicap on the twenty and six more yards of trees between you and the trap, but 10 yards



PARKER 10 AND 20 GAUGE DOUBLE GUNS



LEEFEVER 12 GAUGE DOUBLE GUN

is a fair comparison to the tactics of an old he-woodcock squatting to your pointing dog. It is magnificent brush practice, and you will eventually get 60 to 70 per cent of your clays with practice.

If you own a trap you will soon realise that the saucer holder is the only essential part of it, as far as throwing clay pigeons is concerned. By that I mean that if you unbolt the saucer holder and bolt it through the end of a hickory stick, you have a first-class target sling for surprise fire afield. Get a stick of 1"x1" ash or hickory a yard long, whittle a handle on one end and leave a nub three inches long at the other, which you drill for the bolt of the target holder. Whittle a springy golf-stick taper on the shank and you will then have a sling which will throw clays by hand. With it you can work nearly all the stunts of the fixed trap, with the addition that the thrower can walk out in the country with you, firing a pigeon at unexpected times and places and otherwise endeavouring to get your "goat." A miss entitles him to the gun and you to the sling. This trap is known to catalogues as the "ping pong" trap and a second variation of it is the spring band trap of which more later in our chapter on snap shooting.

A well-known trap shooter handed out this, as it were, knugget of knowledge, one day when we were consuming a pipe before the Travers Island Club-house fire: "Do you know what I do when I get a nervous man afield and he persists in snapping his birds?" demanded the Expert.

"No; I presume you frisk him with playful little discharges of dynamite," I ventured mildly.

"No, I take his shells away from him." Then he knows he might as well take time to aim, and so he gets the habit and gets over being flustered by rising birds."

Listened good to me, but I did not appreciate it until one day we were out at field practice with the portable trap, and, for reasons unnecessary to state, we still had a couple of dozen whole picked-up targets left after the last shell had been fired. Some one suggested silent practice. It didn't sound very inviting, but it *was* great! Everybody got out in the field with empty shells in his gun, and presently a pigeon sizzled by like an express train. Five guns pointed into the air and five triggers snapped.

"Got him sure!" announced two triumphantly.

"Gee! I was rotten!" carolled a third. "I wasn't within a yard of him when I let off. Let's have another."

"I wasn't just ready," explained a fourth, "and I wobbled all over the lot."

"I was slower than running molasses," growled the fifth man. "I had to swing half a turn to my right to get on him at all. Give me a goose egg."

We set off the whole two dozen, and you would be surprised at the number of times you could be *sure* you would have missed,—and why. It was the best practice in the world, and we gathered all but three of the pigeons, still whole, where they had fallen among the goldenrod. And so a busy hour passed before dinner time, an hour full of good practice in swinging and gun pointing that would otherwise have gone profitless. The same pigeons went through the

trap a dozen times before they got down to eight survivors. Remember this stunt some time when the shells are all gone and you still have some time left before pulling up to go home.

CHAPTER XIII

SHOTGUN MECHANICS

ABOUT 1630 the original flintlock was developed by the gunsmiths of Madrid. I have seen one of these originals in the Musée d'Artillerie in Paris, where is assembled the largest collection of firearms in the world, about 2,500 pieces arranged in five great halls. This original lock was named the Miquelet, and it had the whole works assembled outside the lock-plate, with a safety bolt to keep it from going off unawares. To this day the Miquelet lock is still to be found flourishing in the rustic districts back of the Sahara, where the devout Mohammedans are still unaware that the Moors were run out of Spain some time back; but the rest of the world was not content with the Miquelet lock in its original state of dishabille, and so the French, with their inborn sense of the eternal fitness of things, turned it around and sunk the works of the lock into the stock, where they have remained ever since.

This lock was the parent of all the modern shotgun locks in use until the Anson & Deely lock was gotten out, differing radically from it in that the side plate was eliminated entirely and the lock placed under the barrel in a slot in the frame. To this day these two locks give the types used in our various hammerless

guns. The various hammer-locks in use up to the early 90's did not differ materially from the original Miquelet. You had a hammer, a mainspring, a sear, bridle and sear spring, and the whole thing was assembled on a side plate. If the mainspring went backwards you had to cut away wood in the tang to accommodate it. If it went forward, the side plate and mainspring was tucked away in the frame under the barrels. In any event, it made little difference, as far as the lock was concerned, whether the firing apparatus was a flint and powder pan, a nipple and percussion cap or a pin and the primer of a centre-fire cartridge.

But when the hammerless idea came to the fore and the hammer simply had to go, our gunsmiths were at once up against the proposition of how to find room for a hammer also inside the side plate, or else devise a new lock which could be located under the barrels in slots. A few of our makers clung to the side plate; others adopted the so-called Anson & Deely lock, the finest of which, as found on certain English guns, can be picked out by hand from recesses under the tubes.

In addition to the lock problems, the breech-loading gun has quite a complicated set of stresses to counteract in the explosive force of the charge. With the muzzle-loader you had a solid breech and thick walls to the tubes; there was no other way for the explosion to go but out, and there was an end. But with the breech-loader your solid breech disappeared, and you had two alternatives: either use a sliding bolt with locking lugs, as in repeating rifles, or swing

the tubes on a hinge and let a standing breech wall take the rearward stress of the explosion. All the repeating shotguns followed the first course; all the doubles went to the hinge, since a down-sliding breech was out of the question with a double gun. Now, if you have a hinge, the rearward pressure of the cartridge, when exploding, must be equally a forward thrust against the hinge, since action and reaction are always equal.

If the pressure of the explosion is six tons to the square inch and the area of a twelve-gauge cartridge is half a square inch, it is easy to see that the rearward thrust on the breech and the forward thrust on the hinge is three tons. This is a heavy stress to be exerted in a fraction of a second, and it requires a given area of steel to withstand it; the more the better, as far as shooting loose is concerned. For all looseness begins with the compression of the steel in the hinge, due to the constant battering of the thrust of the cartridge in firing. For that reason we see several standard makes of shotguns with *double* under-lug, fitted to close firmly against a stop in the frame, so as to take some of this forward thrust off the hinge itself. Still a further safeguard consists in a doll's-head extension rib or a large bolt through the rib, usually tapered so as to take up or compensate for wear.

If you have ever handled much steel with machine tools, testing machines, etc., you will have observed how very like cheese or molasses candy mild steel is in its action. Pounding batters it so as to change its shape; heavy stress squashes it; a sharp

lathe tool turns off a curl that has all the tenacity and viscosity of cheese, and a punch will drive out a blank just its own size, no matter what the thickness. Tempered steel is vastly different; when it goes it breaks, but such qualities are not what are wanted in the shotgun. Toughness and lack of brittleness are the things we are after. Consequently the parts of a shotgun do not wear, they *compress* out of shape from so much pounding, and the looseness begins, first of all, with the front-and-rear thrust of the cartridge itself. Once a particle of looseness is obtained we get side play, up-and-down motion around the hinge as a centre and the explosion causes all the tremors that enter into the action of a shot-out, poorly made gun.

We all remember how that first cheap Belgian of our boyhood days went to pieces. With no extension rib, with insufficient metal in the hinge, with no extra lug to take some of the strain off the hinge, it was not a shooting season old before the crack at the breech was wide enough to slip a paper into; looseness began to show up in the locking lug; side play appeared and grew until you could shake the tubes by hand in their frame, and, if you were wise, you got rid of her before she shot herself open in your arms.

There is bound to be enough looseness in the action of the best double gun to let you open and shut her with ease, whence opportunity is always at hand for up-and-down play and side strains. Barrel boring and barrel balance have much to do with the tendencies, always violent, for the muzzles to either

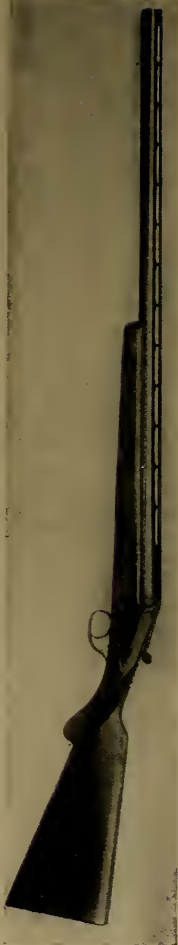
pry up off the frame, using the hinge as a fulcrum, or pry down, exerting a powerful upward thrust against the extension rib and its locking bolt, also against any under-lugs that may be provided with locking bolts. Without extension rib, while a perfectly made gun with plenty of metal in the hinge may stay tight with a single bolt in the under-lug, the least freedom permits side play and upward play which can only end in the gun shooting loose. Each shock makes its infinitesimal inroad on the shape of the steel, and, as mild steel has little elasticity, the effect is cumulative. As the stresses double when they have room to move in and can become kinetic as well as static, it follows that a gun, once it starts to go, will make rapid progress toward the scrap-heap, unless there is a compensating scheme to take up wear provided for by the maker.

A few minor requirements of a good double gun and we are through with the outline of what she ought to be mechanically. The safety should be easily operated, yet not so light as to come off or jar back from shooting or brushing with the hand; it must not become inoperative if a little damp salt air gets into the gun, making it a trifle rusty; it must go on automatically when the gun is opened for any cause whatever, and it should block everything when the gun is open. The hammers should be capable of being snapped on the empty gun without danger of the pin snapping off through crystallisation; the ejectors should be positive and guided firmly so they cannot wobble and get under the rim of the shell; if automatic, only the one whose shell has been fired should



REMINGTON REPEATING SHOTGUN

Made in 12 gauge only. 30-inch barrels, 2½-inch drop.



A HIGH-GRADE SINGLE TRAP GUN

With raised rib to prevent deformation from barrel heat.



WINCHESTER REPEATING SHOTGUN

Made in 12, 16 and 20 gauges.

throw out when the gun is opened, for nothing is so annoying as to have a good cartridge flung overboard from boat or battery, and, finally, when the gun is closed the top lever should automatically snap itself into place.

Since the broad principles of repeating arms have been covered in the chapter on Rifle Mechanics, we can dismiss the repeating shotguns as coming mechanically under the same head, and confine ourselves exclusively to what goes on inside your double when it is loaded and fired. We have space for five representative American double shotguns, Parker, Lefever, Ithaca, Smith and Fox. We have room for a mechanical design of each, showing the action with gun open and hammers cocked. No attempt to draw comparisons between the different makes will be made, for each has its strong points, based upon the honest opinions of its designers, and each reaches the object desired, of a strong, simple, reliable double gun, through sometimes diametrically opposite mechanical principles.

Open before me as I write is my boyhood double, now used by my own son. It is as tight as the day it was made. The hinge has not metal enough, according to modern ideas, but the second lug has a big bearing surface and is well fitted, and I suspect that it has been bearing the brunt of the cartridge thrust all these years. A doll's-head extension has gummed any tendency to side-wobble, and a single locking bolt, engaging a ledge on the rear under-lug, has kept it from getting any up-and-down motion into its system.

Our first illustration shows the action of the Parker, beloved of sportsmen for more than one generation. The lock is an adaptation of the Anson & Deely, or slot type, and the hammers are cocked by a cocking hook on the lug which engages a slider in the frame, which in its turn cocks the hammers. That little pin which you see sticking out of the frame when the gun is apart, and which is pressed down by the fore end when you put it together, has for its function pushing the cocking hook into position to engage the slider. The mainspring is a coiled spring, as are most of the mainsprings in modern actions. Not that it really makes any difference in the life of the lock. What breaks a spring is continuous use up to the capacity of its stretch, as you may know if you have ever used springs much in machinery that must run all day long. In such a case we try to get the spring as long as possible, so as to use but little of its possible stretch. In the same way a coiled mainspring or a flat, bent mainspring are both made of sufficient length so that their total motion is small compared with the length of the spring. Of course, the gunmakers all guarantee their mainsprings forever! No matter whether flat or coiled, when one does go, it is not wear, but defect in tempering. Against the latter it is well-nigh impossible to guard. When I was in active mechanical engineering we had often thousands of springs to make and temper, and though our old toolmaker was a shark at tempering—one of the best in the country—even one of his springs would occasionally fail.

To release the Parker hammers there are sears

on each side which engage the triggers, and when you move the safety forward it interposes a block of steel between the safety toggle and the top of the triggers, so that it is impossible to pull them. Opening the gun shoves this safety block into position so that it is locked whenever the gun is not ready to fire.

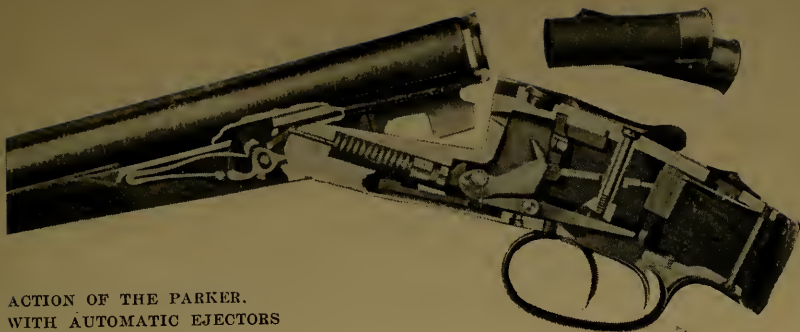
The hammers have the firing-pin forged in one piece with them. This would be an element of breakability from the pins crystallising were it not that the shape of the hammer is such as to strike the frame on the broad face of the hammer at a point some distance below the area of the pin base. The hammers are rebounding, a hammer stirrup coming in contact with the hammer screw, thereby stopping its movement.

In the all-important matter of strength the Parker is well provided. While some makers prefer to put their greatest strength in the locking of the extension rib, on the principle that the farther from the hinge the stronger mechanically is the resistance against opening by up-and-down stress, there is room for an honest difference of opinion here. If the principal strength is put in the direction of resisting the direct forward thrust of the cartridge itself and the gun is thus rigid against that, all the secondary stresses become of minor importance, as they do not get a chance to make themselves felt. So we find in the Parker generous metal area in the hinge joint itself, backed by a second large resisting area in the forward edge of the second lug. This same double bearing is also found on the Ithaca. A further re-

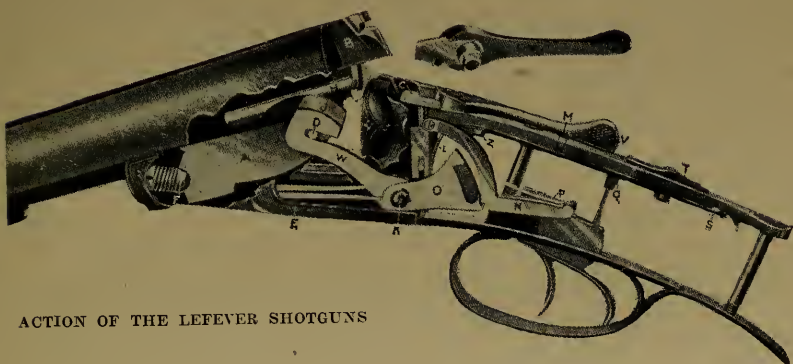
sistance is contributed by the square shoulder of the doll's head extension, but, as I said before, this has but little real effect mechanically, owing to its small area of metal; where it is needed is to counteract side movement and up-and-down movement. This latter function in the Parker is attended to by an under-locking bolt engaging a ledge on the rear under-lug. This is not as strong mechanically as if it were applied at the extension rib at a comparatively greater radius, but, as the hinge and lug resisting area is so very large compared to other designs, the under lug bolt is ample. To compensate for the strain produced by the incessant pounding on this lug bolt a bit of hard steel is dove-tailed in and held by a small pin which can be driven out, permitting a new steel bit to be inserted, so that after years of use it is possible to make this feature as tight as new by putting in the new bit.

It may be argued that no machine fitting that will work mechanically smooth will allow two surfaces, like the hinge bearing and the lug bearing, to both resist the stress of discharge at once. Blackening either one of them will show that both of them cannot be in absolute contact at the same time, but any testing machine will show you that under stress the part first attacked yields infinitesimally until the second part also comes under bearing, taking its half of the stress. When same is relieved, its elasticity returns both parts to normal and the mechanism is free to move. This is what happens with the two bearings of the Parker under lug when the cartridge is fired.

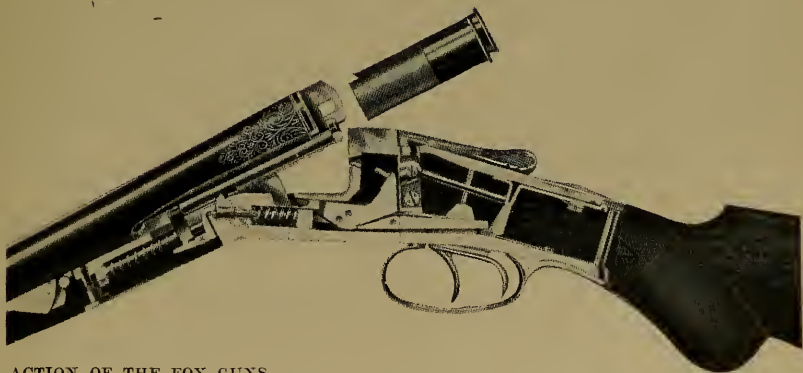
To take the piece apart the trigger guard is first



ACTION OF THE PARKER.
WITH AUTOMATIC EJECTORS



ACTION OF THE LEFEVER SHOTGUNS



ACTION OF THE FOX GUNS

unscrewed, exposing the screw of the under plate, when all the works of the lock can be gotten at.

While the Parker satisfies all the requirements of the ideal in its own manner, we now come to a gun, equally fine, yet arriving at the same goal through an entirely different route. The Lefever, which forms the subject of our next illustration, has a side plate lock, a comparatively small hinge bearing, and much strength of metal is put in the extension rib. When you open the gun the first thing that strikes you is the absence of any under lug and under locking bolt. There is a small link, leading down to the interior of the frame, which, as you will note from an inspection of the working drawing, is the combined cocking lever and extractor cam. The hammer has no firing pin forged integral with it but strikes a pin in the breech base. It can therefore be snapped without injury. The sear is a long curved device, hung from above the hammer and engaging a notch on the hammer head instead of near the main pivot pin as in most guns. The safety blocks the trigger heads; just why it has such a small bearing area that is only operative at one single point is not apparent. The safety must be fully on or it is inoperative, so one must be careful with it and see that no inadvertent handbrush moves it slightly to the rear, or it will fail to engage. The mainspring is of the flat type, which, as we have shown, is quite as durable as the coil type; and visible indicators, projecting through the side plates of the lock, show when either hammer is at cock.

Turning now to the points of safety, the designers,

appreciating the necessity to prevent end play from strains caused by direct thrust of the cartridge head, have made the main bearing compensating, by putting a spherical-headed screw in the main hinge pin, against which the bottom lug gets its bearing. Even granting that the spherical bearing offers more surface than a cylindrical one of the same radius, this would not give metal enough for a durable bearing, so we find that shape of the bottom lug such that when the gun is closed it bears both against the frame at the point F, and, further, has the usual reverse bearing found on all double lugs that fit snugly into a pocket in the frame when the gun is closed. This reverse bearing is essential to take care of the backward thrust of the tubes when the shot leaves the barrel. Otherwise it would all come on the tube ends where they butt against the standing breech, thus introducing crushing strains which would eventually open up a crack between the barrel ends and the breech, and thus let in motion for end play. You will note that the extension rib is of generous size, cut to fit the radius of a circle struck with the hinge as centre, and fitting into a corresponding recess in the frame. This adds considerably to the fore-and-aft bearing surface; and, for up-and-down play, a notch is cut in the extension into which a rotating bolt fits with a taper draw. The action is thus tight, and can be kept so by manipulating the bearing screw in the hinge. The top lever bolt takes care of itself, simply requiring replacing of the bit of steel which forms the bolt as it wears and allows the lever to close out of line.

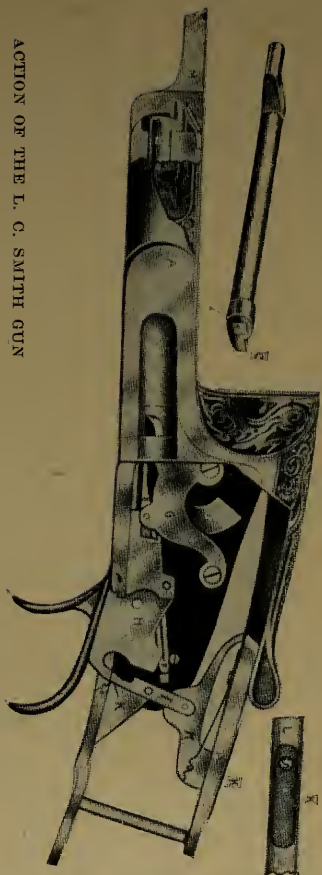
Our next illustration shows a gun midway in design between the former two. The Ithaca shows a fine combination of both principles of gun strength, together with a rapid lock of the Anson & Deely type which has notably few and strong parts. Beginning with the lock, you will note a coiled mainspring impinging directly upon the toe of the hammer, which toe engages a notch in the under lug so that opening the gun cocks the hammer at once. A sear holds the hammer up until its tail is raised by the trigger heads, and this sear is blocked by the safety so that even a hard fall could not jar the sear off, which might happen if merely the trigger heads were blocked. This lock is undoubtedly simple; whether faster than any other is open to doubt, as, no matter where the force is applied, you have the same direct thrust of the spring upon the body of the hammer, forming a simple couple with the hammer pivot pin. This hammer strikes a pin in the standing breech so that snapping it will result in no harm.

In the matter of strength, the simple lock, set well back, enables the designers to get in a second under lug, as in the Parker, thus doubling the available bearing surface against forward thrust of the cartridge head, and providing a ledge for an under bolt. In addition there are two holes for rotary bolts in the extension rib. While a locking bolt here is of prime importance as securing against up-and-down play, the metal remaining after passing both bolts through the extension is not enough in some grades of this gun while in others it is sufficient to play a very considerable rôle in aiding the resistance against

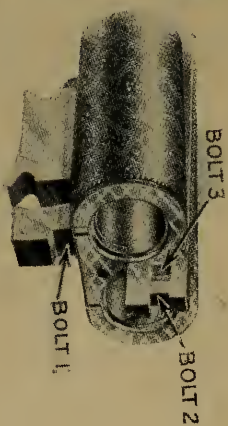
forward strain. However, with the ample surface already provided for, this feature may be regarded as merely an additional precaution, the principal function of the rotary bolt being to resist vertical strain. It is claimed that to have all three of these bolts operative at the same time would be impossible. Theoretically, yes; practically, the argument does not take account of the flexibility of metal under stress; as well claim that the three bearings of an engine do not all operate. Black leading will show that one of them *must* be out of line, yet, when the engine runs, all three bearings do their share and any one of them without oil will promptly heat up, which of course it would not do if it was not carrying its load. In the same way we may have no hesitancy in feeling assured that the stress of discharge is evenly distributed to all three bolts of this gun.

At the same time, no extension rib bolt is adequate of itself without ample bearing at the hinge. I have seen foreign guns with a small pin neatly fitted through the extension rib, yet it can easily be shown that, without a proper hinge or under-lug bearing, the force of the cartridge would shear this pin like a piece of twine. In fact it is a survival of the old muzzle-loading custom of running a pin through the extension into the wood of the stock to hold the barrel in place. Such a pin had only the miscellaneous outside stresses on the barrel to counteract; it never came under the direct rending force of the powder, yet we see this pin persist to this day in foreign guns, so conservative is the craft of the gunsmith.

Yet, if this pin is made of proper size, and the



ACTION OF THE L. C. SMITH GUN



BOLT LOCKS OF THE ITHACA SHOTGUN



ITHACA BOLTING SYSTEM



ITHACA LOCKS

metal back of it of corresponding area, it may well take its share of resisting the rending force of the powder itself, and this we see exemplified in our next gun, the Fox, which Colonel Roosevelt thought so highly of. Here the cross bolt is made of large area, the second bottom lug is done away with, and the bearing hinge and the pin divide the resistance against forward thrust of the cartridge head, which is always the principal force the action of a double gun has to contend with. Side play and vertical play are merely secondary effects of the fore-and-aft rending force of the explosion, since the walls of the tubes take care of its outward thrust. In the Fox the two principles of pinning against vertical play at the point furthest from the hinge centre, and making the main bearings of as generous an area as possible are neatly and simply combined. Since its rotary bolt is tapered, as with all such bolts, and since it has so large a share of the main thrust of the discharge to bear, it follows that the component along the taper, tending to force the top lever back and open the gun, is considerable. For this reason the top lever should work rather stiffly and should not be allowed to come loose.

The locks are simple, of the Anson & Deely type, cocked by a pin on the under lug, engaging the toe of the hammer. The mainspring is of the coiled type, operating on the hammer by a link. When you open the gun you lift the toe of the hammers, thrusting back the main springs at the same time until the sears fall into the hammer notches. The hammer has the firing pin forged integral with it; its shape is not such that one could feel safe against crystallisation

through unlimited snapping. The safety blocks the trigger heads and has a trifle more bearing than the Lefever. In general the Fox is a clean, simple gun, easily gotten at by taking off the under plate, durable and fast.

In the L. C. Smith gun we have another example of the designer pinning his faith to the single hinge bearing and a large through pin in the extension rib. This is made extra long to enable a thick, rather flat bolt to enter. Evidently the designer intended it more to resist vertical movement than the end thrust of the cartridge, for the metal left at the rear of the rib is by no means equal to the area of the pin. However, this has been taken care of by an ample bearing for the one under lug. The designer has also utilised the extra length, given by the curve of the radius struck from centre of hinge through the end of the extension rib, to get a ledge on which to rest a second bolt, adding to his resources against vertical strain.

So much for strength. The locks are of the side plate type with flat mainspring and hammers cocked by roller cocking hook. Safety blocks the trigger heads. This gun is specially sold in one-trigger, though all the other makers can give you one if you wish it. After one learns to shoot it, the one-trigger gun has the advantage of requiring no shift of the trigger finger and no displacement of the holding wrist. It is, however, a specialty, and, like the automatic ejector, a bit of mechanics rather outside the limits of this chapter. All makers have one or another scheme for an automatic ejector, and, if you are get-

ting THE gun of your lifetime, it will pay to strain an extra ten dollars and get it with the automatic ejectors, as the speed of reloading is then nearly doubled, for you have an empty gun the instant you open it, and, with a finger clip to hold the extra shells, are reloaded almost as soon as the mechanical repeater.

This review of our five principal American guns will show the reader that we are in the hands of careful and experienced designers with all of them; that those who condemn one whole class of guns, such as the under lug, as being mechanically unsound, simply have not studied the conditions thoroughly. For the main strain of the rending thrust of the cartridge, it is simply a matter of calculation of the stress and of the metal to withstand it; where to dispose of this metal the best is a matter of the judgment and preferences of the designer. It is a matter of distribution and compromise. All kinds of talking points are made by salesmen on the different features of the designs, yet one's individual preferences must be guided more by the subtler points of taste, the hang of the gun in your hands, the boring and pattern its record shows it can make, minor points of ease of handling, etc., than by any broad claims of superiority of design. Why do I own a Parker, while my assistant editor swears by the Lefever, the crack shot of the *Field and Stream* office has an Ithaca that money couldn't pry him loose from, and the head of the magazine shoots three different makes of American guns? We all have our very definite reasons why, —but a close analysis shows them all to be—just prejudice, mere prejudice!

CHAPTER XIV

SNAP SHOOTING

THAT prince of all American game birds, the ruffed grouse, is responsible for the material of this chapter. Together with his cousin, the woodcock, and his little brother, the bob-white, he is the bird which, more than any other, sets all your hard-won trap honours at naught and makes you offer vainly a million dollars for some ability to snap shoot. Given a skyline or a covey shot at either quail or woodcock, and you can draw on him, swing, lead, and get him as you would snipe or duck; but how often in a dozen chances does Mr. Pa'tridge give you more than a fleeting glimpse of his royal self, as he whisks out of sight through the brush!

The Kid and I were recently on a trip into the mountains where we put up partridges thirty-two times in three days' hunting. Of all these, but six were really good pokes, where a fellow, not a snap shot, would have some chance for his agate, and of these six we made good on three. Some upstate hunters, who never shot anything more difficult than rabbits in their lives, gave us the grand laugh, but we failed to be ashamed—we were no snap shots; we had to *see* him for at least a second to do any damage. Yet, with long, lean, tall Sutton along, how

different would have been the story! Mr. Grouse makes his usual getaway—a burst of wings and a flash of feathers, dimly seen through the brush, and always where least expected—there is a wiggle of Sut's gun, a sharp report as the charge of shot speeds in the direction Pat was going when last seen, a dull thud in the leaves, and Sut cackles "Dead bird!"

How does he do it! He does not know any more than you do. He don't know he has a gun in his hands, even! Simultaneously with the sudden rise of the bird is an equally sudden smash of the gun, and somehow the bird and the shot connect—that's all there is to it! It is all done with the quickness of light; I've seen Sutton make a double on quail right under my nose and both birds were falling through the air before my gun had gotten to shoulder. One day we tried him out at the traps, and Sut drew a squad of professionals. Of course, they made up a little quarter-dollar sweepstakes, and, of course, they asked Sut to join. As it was his first go at the traps, he just chipped in his money to be a good fellow, with no thought of winning. It was a mean, blustery day and the birds wild. Sut went out with twenty-five straight, and the nearest score to him was twenty-two. Can you beat it! I've been four years creeping up to twenty-two at the traps, and cannot depend on that unless wind conditions are easy.

I decided some time ago that I had to have snap shooting as an essential part of my upland shooting education, or else go hungry and gameless. The climax to this decision reached me on a day's woodcock shoot this fall, where Sut and I and a friend

toured the hills in a car, getting off and working up every likely swamp where a rill would flow down between two forested mountains, making an area of thick brush over rich black ooze. This is ideal ground for flight woodcock from Canada, and summer birds raised right in the swamp. The very first patch had a dozen woodcock in it, and, believe me, that many birds can give three sportsmen a world of fun before they lie too close for even the dogs to find them. It was a regular battle at first, with the bang of guns and the shouts of "Mark cock!" sounding through the still, frosty air. Sut stood back of me, so as to give me all the chance in the world, as I was his guest. One after another three cock jumped or flew overhead from our friend's position, and I tabbed a barrel at each of them without drawing a feather. They were too quick and sudden for me—over the top of the brush and gone in an instant!

"For Pete's sake, Cap," growled the exasperated Sutton, "if you aren't going to *hit* any of those birds I'm going to begin to *shoot*. I could have had all three of them easy, and, say—we want some to take home!"

Well, you all know the mortification of missing. There is nothing to do but take it in silence. I recalled sharp-tailed grouse shooting with Frank Stick in Montana, where they rise just outside of poplar draws, whisk over the brush and are gone in a flash. Here I had not fired a shot, just gaping at them with astonishment, while Stick, with one poke of the little 20-gauge for each bird, had knocked three of them cold—his thirty-ninth, fortieth and forty-first con-

secutive chicken without a miss. Snap shooting again—the only kind that gets them in thick cover! While this score is unusual, even for sharptailed prairie chicken, with quail it is infinitely harder. Mr. Barnes, a friend of Warner's and a veteran quail shot, has been years trying to score 25 straight, but usually drops one at or before his twenty-fourth bird.

On this woodcock shoot both of the others had dogs, but it was my lucky year, and I put up twice as much game alone as either of them with their dogs. And three times that day I got a nice skyline shot at a cock and killed him stone dead. But this could not heal the wounds of numerous snap shot misses. Finally, a recent mountain trip for grouse developed such a tremendous proportion of pure snap shots to open ones, where you could really *see* the bird for a time, that, while we banged away, we just had no chance at all.

While snap shots are often born, I am convinced that they can also be made, and I decided to train myself and the Kid in the art, retaining all the proficiency for swinging and leading that we already had. And the implement to learn on would be undoubtedly the clay-pigeon hand-trap. While, as ordinarily handled, the trap man being alongside of or behind the shooter, the hand-trap is a comparatively easy proposition, when you put him at a distance from you and let him shoot the clay birds at an angle with the brush it becomes a great deal harder and requires a lightning-quick snap shot. We decided to take our guns, a bag of blue rocks and the hand-trap out into brush country—Hog Swamp and Brier

Swamp both presented themselves as lovely candidates for schoolroom honours! We chose the latter as nearer; also it had some comparatively open spaces, with just trees and low underbrush to begin on, for there is no use crabbing the whole game by making it too hard at the start.

Here we hied us for Lesson I. The idea was for each in turn to prowl around with his gun looking for trouble, while the other, about twenty-five feet away in the brush, would spring the trap without warning. No aim or follow through was to be taken, just poke the gun at the flying clay and fire. That was just it—aiming *at* the bird, which proved to be our undoing! You do not want to aim *at* him, any more than you would throw a stone *at* him—poke in ahead somewhere so that your bird will fly into your charge of shot. The tendency to aim at the bird and follow through, swinging ahead, was almost irresistible, we found, and it accounted for most of our misses with snap shots at birds in thick cover. There is no use aiming at the bird, for he will not be there when the shot gets out to him; nor can you swing ahead on him, for there is no time. Through brush, behind trees and crash into some branch the pigeon goes, and it's all over in less than a second. If you do not pick him out with a swift snap it's all off. We thought that twenty-five cartridges would be enough for the first afternoon's practice. It wasn't enough by three boxes! All were gone in, it seemed, ten minutes, though we were actually shooting for nearly an hour on our first lesson, and consumed two hours at the business, first and last.



HARD SNAP SHOOTING

At this angle and distance of 30 feet to the trap boy it is nearly impossible to hit them.



THE SNAP-SHOOTING SCHOOL

Double 12 gauge Parker and the Dupont hand trap.



EASY SHOOTING WITH CLEAR SKYLINE

Hand trap alongside or behind is easy at all angles.

And how the hand-trap did show us up for a couple of rank boobs! I, that was good for 22 at the regular trap game, and had always done well with snipe and wildfowl,—well, I hit just three out of fourteen shots! The Kid, who did seven out of fifteen with his twenty-eight at the regular trap stand and always beats me in beach shooting, more especially since he has graduated to the 12-gauge double,—he got just one bird, and that on the second shot of a double. For, of course, we used both barrels. It is part of what this hand trap training is for, to remind you that you have another barrel and to use it, often forgotten in the infrequent chances of actual bird shooting.

And these were not really hard brush shots, either. They were the easiest we could devise. The hand trap man was abreast of you, only about twenty-five feet away, and you knew just where the bird would come from and where he would go. But, unlike the hand trap work at the Camp Fire Club, where the birds are thrown against a skyline and you have time to pick him up and swing, this work was all pure snap shooting. The bird whizzed past, low over the brush between the trees, and you just chucked it to him. We couldn't understand our continuous misses. "Why, I was *sure* I had that one, Pop!" would come the Kid's chagrined cry;—and my own observations on my shooting are best left out of print entirely!

The first box of shells went all too quickly, and we would have given two prices for another box or so. Eked out with some extras from our last hunting trip, we had fourteen shots apiece, usually two

to each bird, as we missed with either one or both barrels. Gee, but we did get shown up! To watch us one would think that neither of us had ever had a gun in our hands before. The birds flew mostly left quartering across our faces, at about 70 degrees angle or 30 degrees off straightaway; the shot load was $7\frac{1}{2}$ chilled, and we were using the 65 per cent choke right barrels, with the full choke for follow shot. The pieces of the birds hit were picked up at 35 yards from the traps, showing very slow shooting, and they did not appear to be thrown from the trap nearly as fast as quail or grouse make their getaway.

Out of the welter of misses, two facts seemed to stand out clearly; we were not pointing the guns where we thought we were, and we were still shooting *at* the bird instead of keeping cool and using some judgment to drive in our shot somewhere ahead of the clay in the direction he was going when the gun got on him. More than anything else, we could not clearly explain just what we were doing when the bird shot through the brush; we just saw him, pointed the gun, and fired. Now this is all very well for a natural-born snap shot, like Sutton, but we were learning by hard practice and close analysis of each move.

Point One, whether we were really pointing the gun where we looked, we decided to test out on the next lesson with a *stationary* target. Suppose you hang the pigeon in a bush thirty yards away, load and cock your gun with your back to it, whirl and fire—how near would you come to hitting it without any conscious aim? If the gun fitted you, you ought to smear it every time, with a bit of practice, as the pat-

tern is 30 inches diameter, equivalent to hitting a thirty-inch bull's-eye with a rifle at thirty yards, certainly no hard feat for a rifle snap. But if you swung fast and shot when the bird was in line you would not hit it, as the swing would throw the shot way to one side. The trigger must be pulled before you reach the bird, about two feet before, as no one can stop a gun absolutely in mid-swing. In order to show just how far off true centre we were getting we decided to use a special shotgun target made by the Shotgun Pattern Target Co., of Milwaukee, Wis., and to be had in any large gun store (forgive this ad. but they are the only people making such a thing). This target has a black silhouette of a clay bird in the centre, a 10-inch, 20-inch and 30-inch black ring surrounding it, and is quartered by horizontal and vertical black lines. It tells you the kind of pattern of your gun at all distances, what distribution of its pattern it makes, whether it shoots true to aim with both barrels, and how many pellets it will put in a flying clay pigeon at various distances. Printed along one side of the target is a table of pellets for various chokes, from 75 per cent to cylinder and for 6, 7, 7½ and 8 shot in all these chokes, a handy reference table saving a lot of figuring, and there is a record blank printed on the target to make your scores permanent and of value to you in the great game of Knowing Your Gun. A dozen of these patterns is none too many for each gun, as you cannot judge except by the average performance of at least ten shots. None of these should be very bad, and the nearer uniform they run the better.

The next Saturday found us giving the rabbits the go-by and on our grounds with a box of shells, a dozen targets, two dozen clay birds and the hand trap. Often we had vowed that a million dollars would be cheap to pay for Sutton's ability as a snap shot; now we were going to see if a \$25 ammunition bill and the giving up of part of the hunting season to a course in snap shooting wouldn't more than repay us. Our very first experiment showed us a fact, often brought out in print, but not realised sufficiently to take strict account of in practice—field guns are sighted to place the charge about eight inches high at 40 yards, so that you can see your bird over the barrels, and should be careful not to cover him too close or you will overshoot. A careful rifle sight at the paper silhouette, at thirty yards with the medium choke barrel, showed the centre of the pattern 7 inches high above the silhouette, which, nevertheless, had eight pellets in it. The diameter of the pattern proved at this range to be 26 inches, and a raise of 4 more inches would have brought only one pellet in the bird, though up to that point it would have gotten six or seven, anyhow. Rule I.—Always see your bird well above the barrels before you tab off.

Experiment No. 2—Can you hit a stationary clay pigeon, turning your back on him, at 30 yards, whirling and firing with a snap poke? Answer, you cannot any more than with a flying bird. Time and again we whirled about, swinging the gun on the clay with no halt, only to find a clean miss; sometimes a hit, but not often, nor with any certainty. This was undoubtedly due to the swing of the barrels carrying

the shot beyond the bird and the cure was to let off before you saw him come over the barrels. But, if you halted ever so little, so as to get a fleeting glimpse of the bird over your sight as you pressed trigger, the result would be a pulverised bird in a wad of pellets. Rule II.—Don't press trigger until you really *see* the bird coming over the barrels, not in the general neighbourhood of him. This rule is more important than it seems, at least to me, for I have found the same thing in all my trap shooting and wild-fowl shooting, you have to see the bird, properly placed over or behind your barrels, and *know* that he is so, if you expect to score a hit. But there is no time to do this in snap shooting as a rule,—your first attempts will be wild pokes with no very clear recollection of just where the bird was in relation to your barrels, except that he seemed to you to be just what you were pointing at.

In a word, I do not believe that mere gun pointing is enough. Fifteen inches out of true in forty yards means a clean miss—can you point at anything that far away and point it as closely as within fifteen inches? Our snaps at stationary marks would seem to say: No,—decidedly not,—you *must* get that instant when you *know* the bird is just coming over your sights.

Shall we, then, find our bird, follow through and swing for lead, as with sky-line work, only do it quicker? I do not think so. Our next attempts with the hand trap demonstrated that you have no time for anything like that. It takes an appreciable time to find where the bird is and where he is going; an-

other instant to point the gun at him,—and then he is gone!

When you hit,—glorious feeling!—an analysis told you that the bird was invariably flying *into* your line of fire, only it was so hard to remember *not* to aim *at* him! And when you missed, it was invariably with the surprised exclamation, “Why, I simply couldn’t have missed that one—I was right on him.” Doubtless true, and also doubtless the very cause of the miss! But we were creeping up. The Kid started off with a fine smash, then a miss, a hit, two misses, a hit, a miss, a hit, another hit, a miss, a hit, two misses;—6x13, or nearly 50 per cent; better than the average brush shooting, but then these were all easy birds, and you knew too much about where they would rise and about where they would go. Some of the misses were explainable, some rabid mysteries; three of the hits were clean smashes, showing a well-centred pattern, three of them had but one pellet in the pigeon when picked up, and a wobble was our only clue to a hit. My own score for Lesson 2 was: two misses, two hits, two misses, a hit, a miss, a hit, a miss, two hits, a miss, a hit;—7x14, or 50 per cent. Four of the hits were elegant smashes; three, one or two pellets. Out of the lesson you got two facts; you hit when you picked up the bird smartly and accurately and *knew* that he was whizzing into your line of fire while you swung. You missed if you poked blindly at him, with no sure sight of him over the barrels; or if you planted the gun on him and pulled; also if you forgot to hold under him. In this lesson we dispensed with the second barrel. It was a

temptation to waste shells, for you would use it on a far chance, just as you would on game, and there was no need, because it would be almost certainly a miss. Later, when we got so we could pick them out with some degree of proficiency, we could bring in the second barrel to make good on the misses.

I foresaw almost as long a road ahead with snap-shooting as with trap shooting. I suppose I have expended about fifteen hundred shells in getting to my present mild attainments in the latter game; with all that practice behind me and the Kid with virtually none at the regular game, we still stood 50-50 in snap-shooting. He has fired perhaps two hundred shots at game, and maybe two hundred more with the 28 in skyline practice with the standard and hand traps, but this brush game is new to him.

Experiment No. 3 we blundered into, and the illustration exemplifies it. You will note my partner in crime hurling a clay with the hand trap, at an acute angle across my face. He is standing at just the distance from the camera that I stood with the gun, about thirty feet. At this distance and angle we both missed ten straight, and so got into a slough of despond that nearly finished me for the scattergun for good. I honestly felt that I had more chance at 'em with the grooved bore, and, as far as results go, I had. The question "What is the matter with us?" grew more insistent with every shot. A field analysis said that we simply had no time to pick up the bird and swing for him; long before you could find him and swing he was gone for good. A real snap shot would be somewhere in ahead of his line of fire with no

swing at all, but this worked out a clean miss every time.

Then I tumbled; we were trying too great a step ahead, without any intermediate step, in other words the trap artist was too far away from the shooter. Calling the Kid over to about ten feet from me, he sent them away at all angles—and I broke eight straight! Why? Because you were now enough behind each bird to swing along his angle without too much gun motion, and had more time to find the bird. On his turns the Kid did about half-and-half with the same scheme, that is, with me firing the trap not over ten feet away from him. In fact, it was almost as easy as the regular hand-trap game, where the trap man stands behind or alongside you, as shown in our third illustration, and fires them *away* from you at various angles, usually with open skyline, as shown.

But this was not what we were after; we wanted the ability to hit crossing snaps, and we had found out the way to do it, for, by progressively moving farther and farther away from the gun, the shots got harder and harder, and the misses climbed up again. But we had the right scheme; all you had to do was to keep at the limit distance until it got easy and then move the trap farther away.

This consumed a whole morning of practice, and our next step was to introduce the standard trap, screwing it down on top of an old tree stump, with spring led back into the bush. The one who set the trap also changed the angle, so that, while you knew where the bird would rise, you did not know which

way he would go. At that, it was not as hard as cross fire, because you were behind the bird, and so he went *away* from you, at an angle.

The reader may not imagine that this chapter is to end with a triumphant record of the production of two finished snap shots, with long strings of clean kills behind them. That takes time and practice—lots of it. What we have devised is an inexpensive working system to teach snap shooting; something that any one with a hand trap can follow out. It is a good winter sport, and really necessary for the majority of us—for, as I am firmly convinced, while a few snap-shots are born, the majority of them can be or have been made.

CHAPTER XV

CARTRIDGES AND TABLES

It cannot be too forcibly impressed on the rifleman that the cartridge, not the rifle, is his main consideration in selecting the arm for the kind of shooting he expects to get. Most popular big game rifle cartridges were designed for certain services, and the rifles were made by the various manufacturers to handle these cartridges, not the cartridges to fit the rifles.

Our chapter on rifle mechanics should give the student some idea of how the various problems were met in iron and steel by the designers; we will now look over the trajectory tables of the cartridges to get some well-defined ideas on what the latter are intended to be used for.

During the '80s and '90s big game was plentiful, and in the Rockies the grizzly bear was still lord of brute creation and prone to charge and attack man. The Indian was still hostile and to be reckoned with, and so we find the cartridges of that day to tend towards stubbiness, so that plenty of them could be put in the tubular magazines; heaviness of bullet was needed to give the greatest pounding power; both of these qualities being at the expense of accuracy and range. Of these cartridges the ideal for deer was the .38-55-225, that is .38 calibre, 55 grains of powder, and a 225-

grain bullet. Its trajectory, in brief its mid-range height of bullet, was $2\frac{7}{8}$ inches for 100 yards, 13.56 for 200 yards, and $34\frac{1}{2}$ inches for 300 yards. This means that when sighting at a mark 100 yards away your bullet would rise $2\frac{7}{8}$ inches at 50 yards, so that if he was really only 50 yards away your bullet would strike nearly 3 inches high if you held dead on him. As the ranges at which deer are shot in the woods vary from 50 to 100 yards, this doesn't make much difference, and to this day the .38-55 is a popular deer cartridge because its 225-grain bullet is a smasher and a deer can carry away more lead, for his size, than any of the hoofed animals. Right now lots of .38-55s are made and sold, the '86 model Winchester, '93 Marlin and '99 Savage handling it, as well as most of the single shot rifles.

But at 200 yards this rise of the bullet was a serious matter, for any error in calculating distance would cause you to overshoot or undershoot. As the bullet rose $13\frac{1}{2}$ inches at 100 yards when held dead on the 200 yard target (with sights of course set for that distance), if the deer happened to be in reality only a hundred yards off you would overshoot him $13\frac{1}{2}$ inches. It was thus very easy to miss at ranges well within the holding power of even a moderately good shot, and at 300 yards, with nearly a yard of mid-range height, you had no chance at all to connect, for who can judge 300 yards correctly in deer country?

For moose and elk the .45-70-500 was a cartridge in the same class and having the same trajectory, and it brought down these animals to stay, at short ranges around 100 yards, and for grizzly, after a number

of hunters had been mauled and killed by bears with several mortal .45 calibre wounds in them, the .50-110-300 Express was gotten out, with a comparatively light bullet of large calibre that would mushroom inside the bear and tear him up so as to knock him down to stay. This cartridge, like the others, had about the same trajectories for the same ranges. In accuracy they were rather poor. Lieut. Whelen, U.S.A., puts the .45-70 and .50-110 in class D, grouping $3\frac{1}{2}$ inches at 100 yards, and 12 inches at 200 yards, and the .38-55 he puts in class C, 3-inch group at 100 yards and 8-inch at 200. This means that, if perfectly held, the bullets will vary inside a 3-inch circle at 100 yards (which is as close as any hunter can hold, and plenty close enough for practical shooting) and vary inside an 8-inch circle at 200 yards, which is *not* close enough for good long-range shooting. Whelen's tests were made with many hundreds of rounds, with all classes of rifles, and have never been questioned. The muzzle velocity of all these short cartridges was around 13 to 16 hundred feet per second, and their striking energy equal to those of any rifle to-day, in fact for woods shooting they are still favourites.

Later they were all loaded with high grade smokeless powders, up to the limit of accuracy that the bullet would stand. This flattened their trajectories about 20%, and increased their striking energy 25%, and all these cartridges to-day are sold both as originally designed and as "H. V." (high velocity), and this represents the maximum perfection that they can attain, for if you attempt to drive these stubby bullets

at any higher velocity their accuracy goes to the winds. The smallest of them all, the .32-20-115, originally designed as a woodchuck and fox rifle, was turned into a passable deer rifle by the H. V. loading, a trifle light perhaps, but good as the old .32-40 black powder, and better than the Kentucky pea rifle with which thousands of deer were killed in our pioneer days. The advantages of the .32-20 in handling three powers of cartridge in the same rifle have been sufficiently brought out earlier in this work.

The need for greater accuracy at longer ranges led to the bringing out of longer cartridges, with more powder and a longer bullet to spin serenely under higher velocities, thus keeping the striking power the same yet flattening the trajectory and increasing the accuracy. Such cartridges were the .32-40-165, the ideal for deer, and the .40-72 for mountain sheep and goat (mostly shot, even then, at ranges of 100 to 200 yards) and the .45-90-300 for moose, elk and bear. These all had about $2\frac{1}{4}$ inches trajectory for 100 yards, 10 inches for 200 yards, and 30 for 300 yards. The H. V. loading improved these trajectories about 30%, and gave them all striking power equal to the best military designs of to-day, so that you will find lots of moose brought down with the .45-90-300 H. V. to-day, as its muzzle energy is 2,644 foot lbs., making it plenty powerful enough for all the largest big game.

Then came the modern military cartridge, in which by necking down the shell we were able to get a big charge of powder behind a long, slender bullet, and this was driven at very high velocities, getting about the same striking energy in spite of its small bullet,

and maintaining a low trajectory and high velocity at long ranges, so that 300 yards was easy shooting and men began to hit bull's-eyes at 500 and 1,000 yards with ease. All this was noted by the big game hunters with enthusiasm, and so the modern hunting cartridges came into use, and the rifles to handle them were designed by the various arms companies. The .30-30-170 displaced the .38-55-225 because its trajectories were 1.58, 5.79 and 15.23 inches for 100, 200 and 300 yards, about half the heights for the older rifle, thus decreasing materially the tendency to miss by overshooting; the .30-40-165 drove out the .45-70-500 for moose and elk, and the .35 and .405 drove out the .45-90 and .50-110-300. These changes seemed made to stay, as the cartridges of the later rifles were much lighter, their trajectories much flatter and in general they seemed about ideal for the purpose intended.

Then came the automatic rifles, in which a number of rapid knock-down shots were wanted quick at short range, and so a whole series of rimless stubby cartridges, with rather long heavy bullets and plenty of steam in the shape of dense powders, was gotten out to work in the various automatic rifles. Such were the .35 Remington, the .351 and .401 Winchester, the .380 Colt, etc. They all lacked accuracy at long ranges, but for the purposes intended were very good. The trajectories were flat, 1.01, 6.47 and 17.06 inches for the Winchester .401-250 being typical of the class. All except the Remington landed in Whelen's Class D, the Rem. getting into Class C, or 3 inches group at 100 yards.

The coming of the U. S. Army Springfield, par-

ticularly its '06 cartridge, marked a new advance in rifle cartridges, based on high velocity. The energy of the bullet varies as the square of the velocity, hence even a small increase of velocity will bring up the energy greatly. Copper jacketing the bullet to hold it together enabled the enormous muzzle velocities of 2,700 to 3,000 feet per second and gave us a whole new class of cartridges, such as the Gov't '06, the Ross .280, the Savage .22 and .250 Hi-power, and the various Newton cartridges. The trajectories of the '06 are typical of the lot, .68 inch for 100 yards, 2.95 for 200 yards, and 7.50 for 300 yards—no chance to miss through overshooting here, at any range for big game hunting! These would seem to be the ideal all-around rifles, good equally at short or long range, powerful enough for everything from deer to Alaskan bear. These rifles are much in use to-day, and the Winchester Model '95 takes the Gov't '06 cartridge, so we can use it in a regular hunting rifle.

However there are flies in the ointment, as usual. The bullets of these cartridges are light, and are driven at such terrific velocities that they often do very erratic stunts, and if they hit a twig are apt to explode or be materially deflected, while the slower bullets merely cut the twig and go on undisturbed. And when the bullet reaches the animal it disintegrates and tears and lacerates tissue to a great extent. The meat around the wound is then full of fine copper fragments and must be thrown away, which is a serious matter in as small an animal as a deer. If it strikes big bones, as in a moose, it may go all to pieces and do no particular harm as far as knocking the animal down

goes. He will surely die of such a wound, but you may never get him, even after tracking him for miles. These facts, which are beyond dispute, occur again and again under my experience for many years as editor of *Field & Stream*, and, while they do not alter the further facts that many and many an animal has gone down never to rise again from a bullet from one of the extra high velocity rifles, they have led many hunters to stick to the somewhat earlier rifles, combining comparatively high velocity with heavy bullets and big shocking power—and that is where the controversy rests at this writing. Many of the more experienced hunters are returning to the lever rifle with its greater quickness of fire and its heavier bullets, having been through several seasons of experience with the high velocity bolt actions; others are more than ever convinced that the latter are the best advance that has yet been made. And the .250-3000-115 Savage is *both* a lever action *and* a high velocity gun, and withal a light, quick handling rifle, of light ammunition, a mighty nice little gun. Personally I cannot aim with it with any great success, as the barrel is too light to hold properly. In selecting your rifle, then, a number of elements must be considered; your personal build and temperament; the game you expect to go after for the most part; the country you expect to shoot in, whether open mountains or wooded ridges; whether you expect to use a supplemental for small game or no; and how many rounds you are likely to need in the entire time of your hunt. A study of the following tables will give you much material to aid in determining your selection.

POWDER CHARGES

Powder Charge Grs. (Weight)	Name of Powder	Name of Cartridge
7 to 8	Sharpshooter.....	{ 25-20 Single Shot 25-20 Repeater 25-21 25-25
16 to 17	Lightning.....	{ 25-35 Win. 25-35 Savage 25-36 Marlin
16 to 17	Lightning.....	{ 25-35 Rem. Auto.
14	Sharpshooter.....	{ 28-30 Stevens
20	Lightning.....	{ 7 m/m Mauser 30-30 Win. 30-30 Mar. 30-30 Sav. 30-30 Rem. Auto.
22	Lightning.....	{ 303 Savage
22	Lightning.....	{ 30-40 U. S. "Krag"
23	Lightning.....	{ 30-40 Win. 1895
23	Lightning.....	{ 30-40 U. S. "Krag" 30-40 Win. 1895
25	Lightning.....	{ 30 U. S. 1903 & 1906
23	Lightning.....	{ 30-45 U. S. Win. 1895
9	Sharpshooter.....	{ 303 British
23	Lightning.....	{ 32-20 32-40
24	Lightning.....	{ 32 Win. Spl.
24	Lightning.....	{ 32 Mar. H. P. S.
25	Lightning.....	{ 8 m/m
33	Lightning.....	{ 32 Rem. Auto.
15 to 16	Sharpshooter.....	{ 33 Win. 1895 351 Win. S. L.
27 to 29	Lightning.....	{ 35 Rem. Auto.
35	Lightning.....	{ 9 m/m Rifle
24 to 25	Lightning.....	{ 35 Win. 1895 35-55 38-72

VELOCITY, ENERGY, PENETRATION AND TRAJECTORY OF BULLETS AND RECOIL OF RIFLES Winchester Repeating Arms Co.

Penetration is not the measure of striking energy. As an illustration, take the figures in our table for the .30-30 Winchester Centre Fire Cartridge. With the soft point bullet the penetration is but 11 boards, whereas that cartridge with the full metal patched bullet will penetrate 42 boards. The energy of both is the same. All other things being equal, the bullet which resists deformation will give the maximum penetration. The soft pointed bullet, which generally stops inside the skin of the animal, delivers its whole energy, while the full metal patched bullet, which passes through the animal, may make a less severe wound. Penetration, therefore, is not a good test of killing power. If the target is harder or softer than that described in our table, the results obtained will not be the same; nor will the comparative results show corresponding difference. The rifles used in determining the following ballistics were equipped with barrels of standard lengths.

NAME OF CARTRIDGE	Wt. of Bullet Grains	Velocities of Bullet Feet Per Second		Energies of Bullet in Foot Lbs.		Penetrations at 15 Ft. in $\frac{1}{4}$ in. Soft Pine Boards			Trajectories			Free Recoil in Foot Pounds	
		At Muzzle	At 100 Yds.	At Muzzle	At 100 Yds.	Lead	S. P.	F. P.	100 Yds. Height at 50 Yds.	200 Yds. Height at 100 Yds.	300 Yds. Height at 150 Yds.	Smokeless Powder	Black Powder
6 mm. Navy.....	112	2562.0	2231.5	1632.8	1239.1	....	12	60	.76	3.49	9.14	7.10	.....
.22 Automatic.....	45	903.2	791.2	81.5	62.6	5	....	....	6.10	....	....	.12	.....
.22 Winchester Rim Fire.....	45	1107.3	915.2	122.6	83.7	7	....	....	4.39	20.82	54.89	....	.32
.22 Winchester Single Shot.....	45	1541.2	1126.0	237.4	126.7	8	....	....	2.55	13.68	38.28	.39	.51
.25-20 Single Shot.....	80	1411.9	1132.6	380.8	245.0	9	8	11	2.74	13.52	35.80	.52	.67
.25-20 Winchester.....	80	1376.3	1168.6	361.8	234.7	9	8	11	2.88	14.08	41.03	.80	.88
.25-20 W. H. V.....	86	1712.2	1371.2	560.0	359.1	....	10	20	1.85	9.37	26.22	1.36	.....
.25-35 Winchester.....	117	1978.1	1680.2	1016.8	733.6	....	11	36	1.32	6.21	16.61	3.39	.....
.30 W. C. F.....	170	2008.3	1735.0	1522.4	1136.6	....	11	42	1.28	5.79	15.23	7.20	.....
.30 Caliber Army.....	220	1997.2	1784.2	1949.0	1555.5	....	13	58	1.10	5.48	13.86	11.59	.....
.30 Caliber Gov't M. '03.....	220	2204.0	1967.0	2374.3	1892.0	....	18	68	1.00	4.52	11.40	....	.....
.30 Caliber Gov't M. '06.....	150	2700.0	2420.2	2428.6	1951.4	....	....	75	.68	2.95	7.50	....	.....
.30 Caliber Gov't M. '06.....	180	2509.5	2290.5	2517.6	2097.4	....	....	....	.70	3.29	8.22	....	.....
.30 Caliber Gov't M. '06.....	190	2403.5	2204.5	2437.6	2050.8	....	....	....	.83	3.57	8.81	....	.....
.303 British.....	215	1999.1	1775.7	1908.3	1505.7	....	13	56	1.23	5.52	14.08	10.98	.....
.32 Self-Loading.....	165	1392.0	1167.0	710.1	499.1	....	10	17	2.70	12.48	33.25	1.92	.....
.32 Winchester.....	115	1222.2	1010.9	381.5	261.0	6.5	6.5	10	3.62	16.93	43.55	1.11	1.24
.32 W. Special.....	170	2112.0	1769.0	1684.2	1181.6	....	12	45	1.17	10.70	20.80	2.66	.....
.32-20 W. H. V.....	115	1640.0	1282.9	689.9	420.4	....	7	17	2.10	10.70	20.80	2.66	.....
.32-20 W. H. V.....	165	1427.7	1194.5	747.0	522.9	8.5	8.5	18	2.45	12.22	31.92	3.08	4.13
.32-40 W. H. V.....	165	1752.4	1460.0	1124.8	781.1	....	10	30	1.70	8.23	22.08	5.45	.....
.33 Winchester.....	200	2056.2	1741.0	1877.7	1346.4	....	13	39	1.21	5.78	15.51	11.35	.....

.35 Self-Loading.....	180	1396.0	1151.0	779.1	529.6	....	9	17	2.74	13.07	34.35	2.83	....
.35 Winchester.....	250	2200.0	1923.0	2687.4	2053.3	....	15	56	1.03	4.73	12.24	19.81	....
.35 Self-Loading.....	180	1861.2	1523.0	1385.0	927.3	....	13	26	1.55	7.60	21.10	5.57	....
.38 Winchester.....	180	1324.0	1053.3	700.8	433.5	....	10	12	3.10	15.53	41.66	3.20	4.69
.38-40 W. H. V.....	180	1775.7	1307.4	1260.9	747.5	....	10	20	1.79	9.46	27.33	6.67	....
.38-55 W. H. V.....	255	1321.0	1131.6	988.3	732.9	....	13	14	2.87	13.56	34.42	5.96	8.41
.38-55 W. H. V.....	255	1593.3	1350.5	1437.2	1032.9	....	10	23	2.01	9.53	25.46	9.42	....
.38-56 Winchester.....	255	1397.0	1189.2	1105.3	800.9	11	12	17	2.61	12.30	31.00	8.13	....
.38-70 Winchester.....	255	1489.5	1262.9	1256.5	903.3	10	12	19	2.05	11.84	28.69	7.16	10.24
.38-72 Winchester.....	275	1476.6	1286.1	1331.7	1010.2	16	15	25	2.27	10.59	27.14	8.70	9.48
.38-90 Winchester Express..	217	1595.8	1313.7	1227.4	831.8	9	....	....	2.05	10.15	27.40	....	9.50
.40-60 Winchester.....	210	1532.7	1220.3	1095.7	694.0	....	....	....	2.34	11.75	31.95	....	6.94
.40-65 Winchester.....	260	1367.2	1145.1	1079.4	757.7	9	11	14.5	2.59	13.24	33.42	6.80	8.08
.40-70 Sharps Straight.....	330	1258.3	1101.6	1160.5	859.4	11.5	....	....	3.11	14.25	35.55	....	11.33
.40-70 Winchester.....	330	1382.8	1196.7	1401.5	1049.6	13	11	19.5	2.66	12.19	33.94	9.23	12.95
.40-72 Winchester Black....	330	1373.0	1190.6	1381.6	1063.2	13	....	....	2.76	12.11	33.91	....	14.56
.40-72 Win. Smokeless.....	300	1423.8	1214.6	1350.7	983.0	....	14	22	2.51	11.84	30.58	9.99	....
.40-82 Winchester.....	200	1492.1	1236.9	1285.0	883.5	12	....	....	2.40	11.26	29.88	8.79	12.10
.40-90 Sharps Straight.....	370	1387.3	1218.2	1581.6	1219.5	16	....	....	2.49	11.75	29.75	....	15.35
.40-110 Winchester Express..	260	1617.0	1278.9	1509.9	944.5	12	....	....	2.11	10.74	29.75	....	16.73
.401 Self-Loading.....	200	2141.8	1721.2	2037.6	1315.9	....	14	34	1.01	6.47	17.06	....	....
.401 Self-Loading.....	250	1875.0	1543.7	1952.0	1323.2	....	12	27	1.49	7.34	20.36	12.18	....
.405 Winchester.....	300	2204.4	1897.7	3236.6	2390.6	....	13	48	1.04	4.85	12.82	28.24	....
.44 Winchester.....	200	1306.0	1034.6	751.4	475.5	9	10	13	3.26	15.94	42.37	3.93	5.42
.44-40 W. H. V.....	200	1569.1	1201.8	1094.9	641.6	....	10	14	2.32	12.12	33.64	5.98	....
.45-60 W. C. F.....	300	1314.6	1091.8	1151.5	794.2	11.5	....	....	3.07	14.50	37.35	....	9.28
.45-70 W. H. V.....	300	1888.1	1539.5	2375.0	1579.2	....	13	25	1.47	7.40	19.65	....	....
.45-70-330 Gould Bullet....	330	1380.0	1155.2	1395.8	973.6	10	....	....	2.75	13.05	33.78	....	12.70
.45-70-350.....	350	1343.8	1139.1	1403.8	1008.6	13	....	....	2.86	14.96	34.32	10.28	14.57
.45-70-405.....	405	1317.6	1143.3	1562.7	1175.8	13	12	18	2.90	13.27	33.55	12.27	16.24
.45-70-500.....	500	1201.1	1081.6	1602.1	1137.2	18	15	20	3.35	14.82	36.12	15.22	18.43
.45-75 W. C. F.....	350	1382.7	1168.2	1485.1	1060.8	14.5	....	....	2.71	12.95	32.94	....	13.61
.45-90 W. C. F.....	300	1531.7	1247.8	1851.3	1037.5	13	15	19	2.28	11.24	30.24	....	16.53
.45-90 W. H. V.....	300	1600.2	1621.5	2644.0	1751.8	....	14	26	1.48	6.63	17.73	18.99	....
.45-90 Winchester Express..	300	1600.0	1375.7	1903.0	1261.0	9.5	....	....	1.88	9.30	28.66	....	22.93
.50-95 Winchester Express..	300	1556.8	1214.2	1614.8	982.3	10	....	....	2.32	11.87	32.69	....	17.48
.50-100-450.....	450	1422.1	1206.6	2021.2	1455.2	16	14	20	2.54	11.90	31.06	21.53	25.17
.50-110-300 Win. Express...	300	1605.8	1250.2	1718.2	1041.4	11	12.5	20	2.17	10.09	31.20	11.32	19.76
.50-110-300 W. H. V.....	300	2242.0	1744.0	3349.3	2026.6	....	14	26	1.12	5.83	17.41	25.62	....

TABLE SHOWING NUMBER OF PELLETS WITH DIFFERENT MEASURES AND SIZE OF SHOT.

SIZE OF SHOT	20 Gauge 7/8 Ounce				16 Gauge 1 Ounce				12 Gauge 1 1/8 Ounces				12 Gauge 1 1/4 Ounces				10 Gauge 1 1/2 Ounces			
	Number pellets in charge	Cylinder Bore 40 per cent.	Modified Choke 60 per cent.	Full Choke 75 per cent.	Number pellets in charge	Cylinder Bore 40 per cent.	Modified Choke 60 per cent.	Full Choke 75 per cent.	Number pellets in charge	Cylinder Bore 40 per cent.	Modified Choke 60 per cent.	Full Choke 75 per cent.	Number pellets in charge	Cylinder Bore 40 per cent.	Modified Choke 60 per cent.	Full Choke 75 per cent.	Number pellets in charge	Cylinder Bore 40 per cent.	Modified Choke 60 per cent.	Full Choke 75 per cent.
TTT	21	8	12	16	24	6	14	18	27	11	16	20	30	12	18	23	36	14	21	25
TT	24	9	14	18	27	11	16	20	30	12	18	22	34	14	20	26	40	16	24	30
T	27	10	16	20	31	12	18	23	35	14	21	26	39	16	23	29	46	18	27	35
T	32	13	19	24	36	14	21	25	40	16	24	30	45	18	27	34	54	21	32	42
BBB	37	15	22	28	42	16	25	31	48	19	28	36	53	21	31	40	63	25	38	47
BB	44	18	26	33	50	20	30	37	56	22	33	42	63	25	37	45	75	30	45	56
B	52	21	33	39	59	23	35	44	66	26	39	50	74	29	44	55	88	35	53	66
1	65	26	39	43	71	28	42	53	80	32	48	60	89	35	53	67	106	42	64	80
2	75	30	45	53	86	34	51	65	97	38	58	73	107	42	64	80	120	51	77	97
3	93	37	55	70	106	42	63	85	110	47	71	90	132	52	79	116	150	63	95	120
4	116	46	69	85	132	52	79	92	148	59	88	111	165	66	99	124	198	74	119	149
5	147	58	88	110	168	67	100	126	189	75	113	142	210	84	126	158	252	100	151	189
6	191	70	114	143	218	87	137	164	245	98	147	184	272	108	163	204	327	130	196	245
7	255	102	153	191	291	116	174	223	327	130	196	245	364	145	218	273	436	175	261	327
7 1/2	302	120	181	227	345	138	207	259	387	159	239	300	431	172	258	323	517	206	310	388
8	350	140	210	263	399	159	239	300	449	170	260	337	490	190	290	374	590	239	350	450
8 1/2	433	173	259	325	495	178	297	391	557	222	334	414	622	248	373	466	748	298	468	560
9	497	198	298	373	568	227	340	466	639	255	383	480	710	284	426	533	852	340	511	639
10	744	296	445	557	848	339	508	636	954	381	572	716	1060	424	636	795	1272	508	763	954

GAME	Powder		Shot	
	Infalible	Orange Extra E. C. or	Quantity	Size
Rabbit.....	24 grains	3 drams	1 $\frac{1}{8}$ oz.	6 or 7
Squirrel.....	24 grains	3 drams	1 $\frac{1}{8}$ oz.	8 or 9
Quail.....	22 or 24 grains	2 $\frac{3}{4}$ or 3 drams	1 or 1 $\frac{1}{8}$ oz.	9 or 10
Bob-White.....	24 grains	3 drams	1 $\frac{1}{8}$ oz.	8 or 9
Woodcock.....	24 or 25 grains	3 $\frac{1}{4}$ or 3 $\frac{1}{2}$ drams	1 $\frac{1}{8}$ or 1 $\frac{1}{4}$ oz.	6 or 7
Snipe.....	26 or 28 grains	3 $\frac{1}{2}$ drams	1 $\frac{1}{4}$ oz.	1, 2 or 3
Plover.....	28 grains	3 $\frac{1}{2}$ drams	1 $\frac{1}{4}$ oz.	T or 1
Ruffed Grouse, Pheasant or Partridge.....	24 or 25 grains	3 or 3 $\frac{1}{4}$ drams	1 $\frac{1}{8}$ or 1 $\frac{1}{4}$ oz.	6 or 7
Ducks.....	24 or 25 grains	3 or 3 $\frac{1}{4}$ drams	1 $\frac{1}{8}$ or 1 $\frac{1}{4}$ oz.	4, 5 or 6
Geese.....	28 grains	3 $\frac{1}{2}$ drams	1 $\frac{1}{4}$ oz.	1, 2 or 3
Swan.....	28 grains	3 $\frac{1}{2}$ drams	1 $\frac{1}{4}$ oz.	T or 1
Turkey.....	24 or 25 grains	3 or 3 $\frac{1}{4}$ drams	1 $\frac{1}{8}$ or 1 $\frac{1}{4}$ oz.	6 or 7
Prairie Chicken.....				
Pinnated Grouse.....				

LOADS, PATTERNS, WEIGHTS AND CORRESPONDING LOADS.

Gauge	Length of Barrels	Weight	Boring	Pattern	Charge	
					Powder, Drams	Shot, Ounces
12	26 to 28	6 $\frac{7}{8}$ to 7 $\frac{1}{8}$	Rt. Cyl. Left Mod.....	50 to 60%	2 $\frac{3}{4}$	1
12	28 to 30	7 $\frac{1}{4}$ to 7 $\frac{1}{2}$	Rt. Mod. Left Full.....	60 to 70%	3 to 3 $\frac{1}{4}$	1 $\frac{1}{8}$
12	32	7 $\frac{3}{4}$ to 8	Full Choke.....	75%	3 $\frac{1}{4}$ to 3 $\frac{1}{2}$	1 $\frac{1}{8}$ to 1 $\frac{1}{4}$
16	28	6 $\frac{1}{4}$ to 6 $\frac{1}{2}$	Rt. Impd. Cyl. Left Mod.....	50 to 55%	2 $\frac{1}{2}$	$\frac{7}{8}$
16	30	6 $\frac{1}{2}$ to 6 $\frac{3}{4}$	Rt. Mod. Left Full.....	60 to 70%	2 $\frac{3}{4}$	$\frac{7}{8}$ to 1
16	32	7 to 7 $\frac{1}{8}$	Full Choke.....	70%	3	1
20	26 to 28	5 $\frac{3}{4}$ to 6 $\frac{1}{8}$	Rt. Impd. Cyl. Left Mod.....	50 to 60%	2 $\frac{1}{4}$	$\frac{3}{4}$
20	28 to 30	6 $\frac{1}{4}$ to 6 $\frac{1}{2}$	Rt. Impd. Cyl. Left Mod.....	50 to 60%	2 $\frac{1}{2}$	$\frac{3}{4}$ to $\frac{7}{8}$
20	32	6 $\frac{3}{4}$ to 7	Full Choke.....	70%	2 $\frac{1}{2}$	$\frac{7}{8}$
28	26 to 28	6	Rt. Mod. Left Choke.....	55 to 60%	2 $\frac{1}{2}$	$\frac{7}{8}$
28	30	6 to 6 $\frac{1}{8}$	Full.....	70%	2 $\frac{1}{2}$	$\frac{3}{4}$

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